B 3 120 869

Digitized by the Internet Archive
in 2008 with funding from
Microsoft Corporation

http://www.archive.org/details/wondersofnaturea00huttrich

THE

WONDERS

OF

NATURE AND ART,

CONTAINING AN ACCOUNT OF

THE MOST REMARKABLE AND CURIOUS

ANIMALS,

AND

MINERAL AND VEGETABLE PRODUCTIONS

IN

THE WORLD;

ALSO, THE

Manufactures, Buildings,

AND

WONDERFUL INVENTIONS OF MAN.

COMPILED FROM WORKS OF ESTABLISHED CELEBRITY.

BY THE REV. W. HUTTON, M. A.

London:

PRINTED FOR A. K. NEWMAN AND CO.; SIMPKIN AND MARSHALL; T TEGG; AND EDWARDS AND KNIBBS; ALSO GRIFFIN AND CO. GLASGOW.

1823.

AG 241
H 8

PREFACE.

TO mark the peculiarities which distinguish the animal, vegetable, and mineral productions of our globe; to exhibit the wonderful works of man, as shewn in the magnificent buildings, singular inventions, and numerous manufactures of different nations and countries, has been the object of the Editor of this Volume; and he trusts it will be found to contain information that cannot fail to form a source of entertainment to persons of all ages, but more especially to youth, whose curiosity naturally seeks for gratification in the contemplation of whatever is wonderful and surprising. It is perhaps by works of this kind, put into the hands of youth, more than by any other means, that those pre-

819

The Upas Tree is surrounded by a circle of high hills and mountains; and the country round it, to the distance of ten or twelve miles from the tree, is entirely barren; not a tree or a shrub, nor even the least plant or grass, is to be seen. The destructive effluvia that proceeds from the tree is supposed to be the cause of this steril appearance. The poison which is procured from this tree is a gum that issues out between the bark and the tree itself, like the camphor. Malefactors who are sentenced to die for their crimes are the only persons who collect the poison, and they are allowed this chance of saving their lives. After sentence is pronounced upon them by the judge, they are asked in court whether they will die by the hands of the excutioner, or go to the Upas Tree for a box of poison; they commonly prefer the latter proposal, as there is not only some chance of preserving their lives, but also a certainty, in case of their safe return, that a provision will be made for them in future by the Emperor; they are also permitted to ask a favour of the Emperor, which is generally of a trifling nature, and usually granted; they are then provided with a silver box, in which they are to put the poisonous gum, and are properly instructed how they are to proceed. While they are upon their dangerous expedition, they are told to pay particular attention to the direction of the winds, as they are to go towards the tree before the wind, so that the effluvia from the tree is always blown from them; they are likewise directed to travel with the utmost despatch, as that is the only method of ensuring a safe return. They are afterwards sent to the house of an old priest, who lives on the nearest habitable spot, appointed by the Emperor to reside there, for the purpose of preparing the souls of those criminals for eternity who are sent to the tree, by prayers and admonitions. To this place they are commonly attended by their friends and relations. When the hour of their departure arrives, the priest puts on them a long leathern cap, with two glasses before their eyes, which comes down as low as their breast, and also provides them with a

pair of leathern gloves; thus equipped, they are conducted by the priest and their relations about two miles on their journey. Here the priest repeats his instructions, and tells them where they are to look for the tree. He shows them a hill, which they are to ascend, and that, on the other side, they will find a rivulet, which will guide them to the Upas. They now take leave of each other, and, amidst prayers for their success, the delinquents hasten away.

Notwithstanding the precautions that are taken, there are scarcely two out of twenty that escape. It is certain, that, from fifteen to eighteen miles round this tree, not only no human creature can exist, but that in that space of ground no living animal of any kind has ever been discovered.

Every man of quality has his dagger or other arms poisoned with the gum of this destructive tree; and, in times of war, the Malayans poison the springs and other waters with it. By this treacherous practice the Dutch suffered greatly during the last war, as it occasioned the loss of half their army. For this reason, they have ever since kept fish in those springs of which they drink, and sentinels are placed near them, who inspect the waters every hour to see whether the fish are alive. If they march into an enemy's country, they always carry live fish with them, which they throw into the water some hours before they venture to drink of it, by which means they have been able in some degree to provide for their security.

DREADFUL DEVASTATIONS OF THE LOCUSTS.

The annals of most of the warm countries are filled with accounts of the devastations produced by locusts, who sometimes make their appearance in clouds of vast extent. They seldom visit Europe in such swarms as formerly; yet in the warmer parts of it they are

still formidable.—Those, which have at uncertain intervals visited Europe in our memory, are supposed to have come from Africa: they are a large species, about three inches long. The head and horns are of a brownish colour; it is blue about the mouth, as also on the inside of the larger legs. The shield which covers the back is greenish; and the upper side of the body brown, spotted black, and the under side purple. The upper wings are brown, with small dusky spots, and one larger spot at the tips. The under wings are more transparent, and of a light brown tinctured with green, but there is a dark cloud of spots near the tips.—These insects are bred in the warm parts of Asia and Africa, from whence they have often taken their flight into Europe, where they committed terrible devastations. They multiply faster than any other animal in the creation, and are truly terrible in the countries where they breed. Some of them were seen in different parts of Britain in the year 1748, and great mischiefs were apprehended: but, happily for us, the coldness of our climate, and the humidity of our soil, are very unfavourable to their production; so that, as they are only animals of a year's continuance, they all perished without leaving a young generation to succeed them.

When the locusts take the field, it is said they have a leader at their head, whose flight they observe, and pay a strict regard to all his motions. They appear at a distance like a black cloud, which, as it approaches, gathers upon the horizon, and almost hides the light of day. It often happens, that the husbandman sees this imminent calamity pass away without doing him any mischief; and the whole swarm proceeds onward to settle upon some less fortunate country. In those places, however, where they alight, they destroy every green thing, stripping the trees of their leaves, as well as devouring the corn and grass. In the tropical climates they are not so pernicious as in the more southern parts of Europe. In the first, the power of vegetation is so strong, that an interval of three or four days repairs the damage; but in

Europe this cannot be done till next year. Besides, in their long flights to this part of the world, they are famished by the length of their journey, and are therefore more voracious wherever they happen to settle. But as much damage is occasioned by what they destroy as by what they devour. Their bite is thought to contaminate the plant, and either to destroy or greatly to weaken its vegetation. To use the expression of the husbandmen, they burn wherever they touch, and leave the marks of their devastation for three or four years ensuing. When dead, they infect the air in such a manner that the stench is insupportable. Orosius tells us, that in the year of the world 3800, Africa was infested with a multitude of locusts. After having eaten up every thing that was green, they flew off and were drowned in the sea; where they caused such a stench as could not have been equalled by the putrefying carcases of 100,000 men.

In the year 1650, a cloud of locusts was seen to enter Russia in three different places; and from thence they spread themselves over Poland and Lithuania in such astonishing multitudes, that the air was darkened, and the earth covered with their numbers. In some places they were seen lying dead, heaped upon each other to the depth of four feet; in others, they covered the surface like a black cloth; the trees bent with their weight, and the damage which the country sustained exceeded computation.

In Barbary, their numbers are formidable; and Dr. Shaw was a witness of their devastations there in 1724. Their first appearance was in the latter end of March, when the wind had been southerly for some time. In the beginning of April, their numbers were so vastly increased, that, in the heat of the day, they formed themselves into large swarms that appeared like clouds, and darkened the sun. In the middle of May they began to disappear, retiring into the plains to deposit their eggs. In June the young brood began to make their appearance, forming many compact bodies of several hundred yards square; which after-

wards, marching forward, climbed the trees, walls, and houses, eating every thing that was green in their way. The inhabitants, to stop their progress, laid trenches all over their fields and gardens, which they filled with water. Some placed large quantities of heath, stubble, and such like combustible matter, in rows, and set them on fire on the approach of the locusts. But all this was to no purpose; for the trenches were quickly filled up, and the fires put out by the great numbers of swarms that succeeded each other. A day or two after one of these was in motion, others that were just hatched came to glean after them, gnawing off the young branches, and the very bark of the trees. Having lived near a month in this manner, they arrived at their full growth, and threw off their worm-like state, by casting their skins. To prepare themselves for this change, they fixed their hinder part to some bush or twig, or corner of a stone, when immediately, by an undulating motion used on this occasion, their heads would first appear, and soon after the rest of their bodies. The whole transformation was performed in seven or eight minutes time, after which they remained for a little while in a languishing condition; but as soon as the sun and air had hardened their wings, and dried up the moisture that remained after casting off their sloughs, they returned to their former greediness, with an addition both of strength and agility. But they did not long continue in this state before they were entirely dispersed. After laying their eggs, they directed their course northward, and probably perished in the sea. In that country, however, the amazing fertility of the soil and warmness of the climate generally render the depredations of these insects of little consequence; besides that many circumstances concur to diminish their number. Though naturally herbivorous, they often fight with each other, and the victor devours the vanquished. They are the prey, too, of serpents, lizards, frogs, and the carnivorous birds. They have been found in the stomachs of the eagle and different kinds of owls. They are also used as

food by the Moors; who go to hunt them, fry them in oil or butter, and sell them publicly at Tunis and other places.

In 1754, 1755, 1756, and 1757, great devastations were committed in Spain by a species of locusts, of which we have the following description by Don Guillermo Bowles, published in Dillon's Travels through that country. "The locusts are continually seen in the southern parts of Spain, particularly in the pastures and remote uncultivated districts of Estramadura, but in general are not taken notice of, if not very numerous, as they commonly feed upon wild herbs, without preying upon gardens and cultivated lands, or making their way into houses. The peasants look at them with indifference while they are frisking about in the field, neglecting any measure to destroy them till the danger is immediate and the favourable moment to remedy the evil is elapsed. Their yearly number is not very considerable, as the males are far more numerous than the females. If an equal proportion were allowed only for ten years, their numbers would be so great as to destroy the whole vegetative system. Beasts and birds would starve for want of subsistence, and even mankind would become a prey to their ravenous appetites. In 1754, their increase was so great from the multitude of females, that all La Mancha and Portugal were covered with them and totally ravaged. The horrors of famine were spread even farther, and assailed the fruitful provinces of Andalusia, Murcia, and Valencia.

"The amours of these creatures are objects of surprise and astonishment, and their union is such that it is difficult to separate them. When this separation is voluntary, after having lasted some hours, they are so exhausted, that the male retires immediately to the water for refreshment, where, losing the use of his limbs, he soon perishes, and becomes an easy prey to the fish; having given life to his offspring at the expence of his own. The female, disembarrassed, though not without violent struggle, spends the remainder of her days in some solitary place, busy in

forming a retreat under ground, where she can secure her eggs, of which she generally lays about forty, screening them by her sagacity from the intemperature of the air, as well as the more immediate danger of the plough or the spade, one fatal blow of which would destroy all the hopes of a rising generation.

"The manner of her building this cell is equally surprising. In the hinder part of her body, nature has provided her with a round smooth instrument, eight lines in length, which at its head is as big as a writing-quill, diminishing to a hard sharp point, hollow within like the tooth of a viper, but only to be seen with a lens. At the root of this vehicle there is a cavity, with a kind of bladder, containing a glutinous matter, of the same colour, but without the consistency or tenacity, of that of the silk-worm, as I found by an experiment, made for the purpose, by an infusion in vinegar, for several days, without any effect. The orifice of the bladder corresponds exactly with the instrument which serves to eject the glutinous matter. It is hid under the skin of the belly, and its interior surface is united to the moveable parts of the belly, and can partake of its motions, forming the most admirable contexture for every part of its operations, as she can dispose of this ingredient at pleasure, and eject the fluid, which has three very essential properties: first, being indissoluble in water, it prevents its young from being drowned; next, it resists the heat of the sun, otherwise the structure would give way and destroy its inhabitants; lastly, it is proof against the frost of winter, so as to preserve a necessary warmth within. For greater security, this retreat is always contrived in a solitary place: for, though a million of locusts were to light upon a cultivated field, not one would deposit her eggs there; but, wherever they meet a barren and lonesome situation, there they are sure to repair and lay their eggs.

"These locusts seem to devour, not so much from a ravenous appetite, as from a rage of destroying every thing that comes in their way. It is not surprising, that they should be fond of the most juicy

plants and fruits, such as melons, and all manner of garden fruits and herbs, and feed also upon aromatic plants, such as lavender, thyme, rosemary, &c. which are so common in Spain, that they serve to heat ovens: but it is very singular, that they equally eat mustard-seed, onions, and garlic; nay even hemlock, and the most rank and poisonous plants, such as the thorn-apple and deadly night-shade. They will even prey upon crowfoot, whose causticity burns the very hides of beasts; and such is their universal taste, that they do not prefer the innocent mallow to the bitter furze, or rue to worm-wood, consuming all alike, without predilection or favour; with this remarkable circumstance, that, during the four years they committed such havock in Estramadura, the love-apple, or *lycopersicon solanum* of Linnæus, was the only plant that escaped their rapacious tooth, and claimed a respect to its root, leaves, flowers, and fruit. Naturalists may search for their motives which I am at a loss to discover; the more so, as I saw millions of them light on a field near Almaden, and devour the woollen and linen garments of the peasants, which were lying to dry on the ground. The curate of the village, a man of veracity, at whose house I was, assured me, that a tremendous body of them entered the church, and devoured the silk garments that adorned the images of the saints, not sparing even the varnish on the altars. The better to discover the nature of such a phenomenon, I examined the stomach of the locust, but only found one thin and soft membrane, with which, and the liquor it contains, it destroys and dissolves all kind of substances, equally with the most caustic and venomous plants: extracting from them a sufficient and salutary nourishment.

"Out of curiosity to know the nature of so formidable a creature, I was urged to examine all its parts with the utmost exactness; its head is of the size of a pea, though longer, its forehead pointing downwards like the handsome Andalusian horse, its mouth large and open, its eyes black and rolling, added to a timid aspect not unlike a hare. With such a dastardly

countenance, who would imagine this creature to be the scourge of mankind! In its two jaws it has four incisive teeth, whose sharp points traverse each other like scissars, their mechanism being such as to gripe or to cut. Thus armed, what can resist a legion of such enemies? After devouring the vegetable kingdom, were they, in proportion to their strength and numbers, to become carnivorous like wasps, they would then be able to destroy whole flocks of sheep, even to the dogs and shepherds; as we are told of ants in America, that will overcome the fiercest serpents.

"The locust spends the months of April, May, and June, in the place of its birth: at the end of June its wings have a fine rose-colour, and its body is strong. Being then in their prime, they assemble for the last time, and burn with a desire to propagate their species: this is observed by their motions, which are unequal in the two sexes. The male is restless and solicitous; the female is coy, and eager after food, flying the approaches of the male, so that the morning is spent in the courtship of the one and the retreat of the other. About ten o'clock, when the warmth of the sun has cleared their wings from the dampness of the night, the females seem uneasy at the forwardness of the males, who continuing their pursuit, they rise together five hundred feet high, forming a black cloud that darkens the rays of the sun. The clear atmosphere of Spain becomes gloomy, and the finest summer-day of Estramadura more dismal than the winter of Holland. The rustling of so many millions of wings in the air, seems like the trees of a forest agitated by the wind. The first direction of this formidable column is always against the wind, which if not too strong, the column will extend about a couple of leagues. The locusts then make a halt, when the most dreadful havock begins; their sense of smell being so delicate, they can find at that distance a corn-field or a garden, and, after demolishing it, rise again in pursuit of another: this may be said to be done in an instant. Each seems to have, as it were, four arms and two feet: the males climb up the

plants, as sailors do the shrouds of a ship, and nip off the tenderest buds, which falls to the females below.

"Many old people assured me, when so much mischief was done in 1754, it was the third time in their remembrance, and that they always are found in the pasture-grounds of Estramadura, from whence they spread into the other provinces of Spain. They are certainly indigenous, being of a different shape from those of the north or the Levant, as is evident in comparing them with such in the cabinets of natural history. The locust of Spain is the only one that has rose-coloured wings: besides, it is impossible they can come from any other part. From the north it is clear they do not, by the observation of so many ages; from the south they cannot, without crossing the sea, which is hardly possible by the shortness of their flight: and, like birds of passage, they would be known. I once saw a cloud of them pass over Malaga, and move towards the sea, and go over it, for about a quarter of a league, to the great joy of the inhabitants, who concluded they would soon be drowned; but, to their disappointment, they suddenly veered about towards the coast, and pitched upon an uncultivated space surrounded with vineyards, which they soon after quitted. When once they appear, let the number demolished be ever so great, the proportion remaining is still too considerable: therefore, the only way to put an end to such a calamity is to attack them before-hand, and destroy their eggs, by which means they might be totally extirpated."

PHENOMENA OF BURNING SPRINGS.

Of these there are many in different parts of the world; particularly one in Dauphiny near Grenoble; another near Hermanstadt in Transylvania; a third at Chermay, a village near Switzerland; a fourth in the canton of Friburg; and a fifth not far from the city of Cracow in Poland. There also is, or was, a

famous spring of the same kind at Wigan, in Lancashire, which, upon the approach of a lighted candle, would take fire and burn like spirits of wine for a whole day. But the most remarkable one of this kind, or at least that of which we have the most particular description, was discovered in 1711 at Brosely in Shropshire. The following account of this remarkable spring was given by the Rev. Mr. Mason, Woodwarden Professor at Cambridge, dated February 18th, 1746: "The well for four or five feet deep is six or seven feet wide; within that is another less hole of like depth dug in the clay, in the bottom whereof is placed a cylindric earthen vessel, of about four or five inches diameter at the mouth, having the bottom taken off, and the sides well fixed in the clay rammed close about it. Within the pot is a brown water, thick as puddle, continually forced up with a violent motion beyond that of boiling water, and a rumbling hollow noise, rising or falling by fits five or six inches; but there was no appearance of any vapour rising, which perhaps might have been visible, had not the sun shone so bright. Upon putting a candle down at the end of a stick, at about a quarter of a yard distance, it took fire, darting and flashing after a very violent manner for about half a yard high, much in the manner of spirits in a lamp, but with great agitation. It was said, that a tea-kettle had been made to boil in about nine minutes time, and that it had been left burning for forty-eight hours without any sensible diminution. It was extinguished by putting a wet mop upon it; which must be kept there for a little time, otherwise it would not go out. Upon the removal of the mop there arises a sulphureous smoke lasting about a minute, and yet the water is cold to the touch." In 1755, this well totally disappeared by the sinking of a coal-pit in its neighbourhood.

The cause of the inflammable property of such waters, is with great probability supposed to be their mixture with petroleum, which is one of the most inflammable substances in nature, and has the property of burning on the surface of water.

There are burning fountains in Iceland, of a most extraordinary nature; forming at times *jets d'eaux* of scalding water ninety-four feet high and thirty in diameter, creating the most magnificent gerbes that can be imagined, especially when backed by the setting sun. They arise out of cylindrical tubes of unknown depths: near the surface they expand into apertures of a funnel shape, and the mouths spread into large extent of stalactical matter, formed of successive scaly concentric undulations. The playing of these stupendous spouts is foretold by noises roaring like the cataract of Niagara. The cylinder begins to fill: it rises gradually to the surface, and gradually increases its height, smoking amazingly, and flinging up great stones. After attaining its greatest height it gradually sinks till it totally disappears. Boiling *jets d'eaux* and boiling springs are frequent in most parts of the island. In many parts they are applied to the culinary uses of the natives. The most capital is that which is called *Geyer* or *Geyser*, in a plain rising into small hills, and in the midst of an amphitheatre, bounded by the most magnificent and various-shaped icy mountains; amongst which the three-headed Hecla soars pre-eminent.—These are not confined to the land only; they rise in the very sea, and form scalding fountains amidst the waves. Their distance from the land is unknown; but the new volcanic isle, twelve miles off the point of Reickenes, emitting fire and smoke, proves that the subterraneous fires and waters extend to that space; for these awful effects arise from the united fury of these elements.

ART OF MAKING PINS.

Though pins are apparently simple, their manufacture is, however, not a little curious and complex. We shall therefore give the reader an account of it from Ellis's Campagna of London:

"When the brass-wire, of which the pins are form-

ed, is first received at the manufactory, it is generally too thick for the purpose of being cut into pins. The first operation therefore is that of winding it off from one wheel to another with great velocity, and causing it to pass between the two, through a circle in a piece of iron of smaller diameter; the wire being thus reduced to its proper dimensions, is straitened by drawing it between iron pins, fixed in a board in a zig-zag manner, but so as to leave a straight line between them: afterwards it is cut into lengths of three or four yards, and then into smaller ones, every length being sufficient to make six pins; each end of these is ground to a point, which was performed when I viewed the manufactory by boys who sat each with two small grinding stones before him, turned by a wheel. Taking up a handful, he applies the ends to the coarsest of the two stones, being careful at the same time to keep each piece moving round between his fingers, so that the points may not become flat: he then gives them a smoother and sharper point, by applying them to the other stone, and by that means a lad of twelve or fourteen years of age is enabled to point about sixteen thousand pins in an hour. When the wire is thus pointed, a pin is taken off from each end, and this is repeated till it is cut into six pieces. The next operation is that of forming the heads, or, as they term it, head-spinning; which is done by means of a spinning-wheel, one piece of wire being thus with astonishing rapidity wound round another, and the interior one being drawn out, leaves a hollow tube between the circumvolutions: it is then cut with sheers; every two circumvolutions or turns of the wire forming one head; these are softened by throwing them into iron pans, and placing them in a furnace till they are red-hot. As soon as they are cold, they are distributed to children, who sit with anvils and hammers before them, which they work with their feet, by means of a lathe, and, taking up one of the lengths, they thrust the blunt end into a quantity of the heads which lie before them, and catching one at the extremity, they apply them immediately to the anvil and

hammer, and by a motion or two of the foot, the top and the head are fixed together in much less time than can be described, and with a dexterity only to be acquired by practice; the spectator being in continual apprehension for the safety of their fingers ends. The pin is now finished as to its form, but still it is merely brass; it is therefore thrown into a copper, containing a solution of tin and the leys of wine. Here it remains for some time; and when taken out assumes a white though dull appearance: in order therefore to give it a polish, it is put into a tub containing a quantity of bran, which is set in motion by turning a shaft that runs through its centre, and thus by means of friction it becomes perfectly bright. The pin being complete, nothing remains but to separate it from the bran, which is perfectly similar to the winnowing of corn; the bran flying off and leaving the pin behind fit for immediate sale. I was the more pleased with this manufactory, as it appeared to afford employment to a number of children of both sexes, who are thus not only prevented from acquiring the habits of idleness and vice, but are on the contrary initiated in their early years in those of a beneficial and virtuous industry."

ACCOUNT OF THE CELEBRATED

SALT-MINES OF WEILITSKA, IN POLAND.

(From recent Travels.)

Before we quitted this part of Poland, we visited the celebrated salt-mines of Weilitska, which are situated within eight miles of Cracow. These mines are excavated on a ridge of hills on the northern extremity of the chain which joins to the Carpathian mountains: they take their appellation from the small village of Weilitska; but are sometimes called in foreign countries the mines of Cracow, from their vicinity to that city.

Upon our arrival at Weilitska, we repaired to the

mouth of the mines. Having fastened three separate hammocks in a circle round the great rope that is employed in drawing up the salt, we seated ourselves in a commodious manner, and were let down gently, without the least apprehension of danger, about one hundred and sixty yards below the first layer of salt. Quitting our hammocks, we passed a long and gradual descent, sometimes through broad passages or galleries capable of admitting several carriages abreast; sometimes down steps cut in the solid salt, which had the grandeur and commodiousness of the stair-case in a palace. We each of us carried a light, and several guides preceded us with lamps in their hands: the reflection of these lights upon the glittering sides of the mine was extremely beautiful, but did not cast that luminous splendour which some writers have compared to the lustre of precious stones.

The salt dug from this mine is called *Ziebna*, or green salt, for what reason I cannot determine; for its colour is an iron-grey; when pounded it has a dirty ash-colour like what we call brown salt. The quality improves in proportion to the depth of the mine: towards the sides and surface it is mixed with earthy or stony particles; lower down it is said to be perfectly pure, and requires no other process before it is used than to be pounded. The finest of this grey salt, however, is of a weak quality when compared with our common sea-salt: it is therefore undoubtedly by no means perfectly pure, but is blended with extraneous mixtures, though it serves very well for common purposes. Being almost as hard as stone, the miners hew it with pick-axes and hatchets, by a tedious operation, into large blocks, many of which weigh six or seven hundred pounds. These large masses are raised by a windlass, but the smaller pieces are carried up by horses along a winding gallery, which reaches to the surface of the earth.

Besides grey salt, the miners sometimes discover small cubes of white salt, as transparent as crystal, but not in any considerable quantity; they find likewise occasionally pieces of coal and petrified wood buried in the salt.

The mine appears to be inexhaustible, as will easily be conceived from the following account of its dimensions. Its known breadth is 1115 feet; its length 6691 feet; and depth 743; and the best judges on the spot suppose, with the greatest appearance of probability, this solid body of salt to branch into various directions, the extent of which cannot be known: of that part which has been perforated, the depth is only calculated as far as they have hitherto dug; and who can ascertain how much farther it may descend?

Our guide did not omit pointing out to us, what he considered as one of the most remakable curiosities of the place, several small chapels excavated in the salt, in which mass is said on certain days of the year; one of these chapels is above thirty feet long and twenty-five broad; the altar, the crucifix, the ornaments of the church, the statues of several saints, are all carved out of the salt.

Many of the excavations or chambers, from whence the salt has been dug, are of an immense size: some are supported with timber, others by vast pillars of salt, which are left standing for that purpose: several of vast dimensions are without any support in the middle. I remarked one of this latter sort in particular, which was certainly eighty feet in height, and so extremely long and broad, as almost to appear amid the subterraneous gloom without limits. The roofs of these vaults are not arched, but flat. The immense size of these chambers, with spacious passages or galleries, together with the chapels abovementioned, and a few sheds built for the horses which are foddered below, probably gave rise to the exaggerated accounts of some travellers, that these mines contain several villages inhabited by colonies of miners, who never see the light. It is certain that there is room sufficient for such purposes; but the fact is, that the miners have no dwellings under ground, none of them remaining below more than eight hours at a time, when they are relieved by others from above. Those mines are of a most stupendous extent and depth, and are sufficiently wonderful without the least

exaggeration. We found them as dry as a room, without the least damp or moisture; observing only in our whole progress one small spring of water, which is impregnated with salt as it runs through the mine.

Such an enormous mass of salt exhibits a wonderful phenomenon in the natural history of this globe.—Monsieur Guerard, who visited these mines with great attention, and who has published a treatise upon the subject, informs us, that the uppermost bed of earth at the surface immediately over the mines is sand, the second clay, occasionally mixed with sand and gravel, and containing petrefactions of marine bodies, the third calcarious stone. From all these circumstances he conjectures that this spot was formerly covered by the sea, and that the salt is a gradual deposit formed by the evaporation of its waters.

ORIGIN AND INVENTION OF CLOCKS.

There have been very considerable differences among nations with regard to the beginning and ending of their days. The beginning of the day was counted from sun-rise by the Babylonians, Syrians, Persians, and Indians. The civil day of the Jews was begun from sun-rise, and their sacred one from sun-set; the latter mode of computation being followed by the Athenians, Arabs, ancient Gauls, and other European nations. According to some, the Egyptians began their day at sun-set, while others are of opinion that they computed from noon or from sun-rise: and Pliny informs us that they computed their civil day from one midnight to another. It is probable, however, that they had different modes of computation in different provinces or cities. The Ausonians, the most ancient inhabitants of Italy, computed the day from midnight; and the astronomers of Cathay and Oighur in the East Indies reckoned in the same manner. This mode of computation was adopted by Hipparchus,

Copernicus, and other astronomers, and is now in common use among ourselves. The astronomical day, however, as it is called, on account of its being used in astronomical calculations, commences at noon, and ends at the same time the following day. The Mahometans reckon from one twilight to another. In Italy, the civil day commences at some indeterminate point after sun-set; whence the time of noon varies with the season of the year. At the summer solstice, the clock strikes sixteen at noon, and nineteen at the time of the winter solstice. Thus also the length of each day differs by several minutes from that immediately preceding or following it. This variation occasions a considerable difficulty in adjusting their time by clocks. It is accomplished, however, by a sudden movement which corrects the difference when it amounts to a quarter of an hour; and this it does sometimes at the end of eight days, sometimes at the end of fifteen, and sometimes at the end of forty. Information of all this is given by a printed kalendar, which announces, that from the 16th of February, for instance, to the 24th, it will be noon at a quarter past eighteen; from the 24th of February to the 6th of March, it will be noon at eighteen o'clock precisely; from the 1st of June to the 13th of July, the hour of noon will be at sixteen o'clock; on the 13th of July it will be at half an hour after sixteen; and so on throughout the different months of the year. This absurd method of measuring the day continues, notwithstanding several attempts to suppress it, throughout the whole of Italy, a few provinces only excepted.

The subdivisions of the day have not been less various than the computations of the day itself. The most obvious division, and which could at no time, nor in no age, be mistaken, was that of morning and evening. In process of time the two intermediate points of noon and midnight were determined; and this division into quarters was in use long before the invention of hours.

From this subdivision probably arose the method used by the Jews and Romans of dividing the day and

night into four vigils or watches. The first began at sun-rising, or six in the morning; the second at nine; the third at twelve; and the fourth at three in the afternoon. In like manner the night was divided into four parts; the first beginning at six in the evening, the second at nine, the third at twelve, and the fourth at three in the morning. The first of the divisions was called by the Jews the third hour of the day; the second the sixth; the third the ninth; and the fourth the twelfth, and sometimes the eleventh. Another division in use, not only among the nations above-mentioned, but the Greeks also, was that which reckoned the first quarter from sun-set to midnight; the second from midnight to sun-rise; the third, or morning watch, from morning to noon; and the fourth from noon to sun-set.

It is uncertain at what time the more minute subdivision of the day into hours first commenced. It does not appear from the writings of Moses that he was acquainted with it, as he mentions only the morning, mid-day, evening, and sun-set. Hence we may conclude, that the Egyptians at that time knew nothing of it, as Moses was well skilled in their learning. According to Herodotus, the Greeks received the knowledge of the twelve hours of the day from the Babylonians. It is probable, however, that the division was actually known and in use before the name hour was applied to it; as Censorinus informs us that the term was not made use of in Rome for three hundred years after its foundation; nor was it known at the time the twelve tables were constructed.

The eastern nations divide the day and night in a very singular manner; the origin of which is not easily discovered. The Chinese have five watches in the night, which are announced by a certain number of strokes on a bell or drum. They begin by giving one stroke, which is answered by another; and this is repeated at the distance of a minute or two, until the second watch begin, which is announced by two strokes; and so on throughout the rest of the watches. By the ancient Tartars, Indians, and Persians, the day

was divided into eight parts, each of which contained seven hours and a half. The Indians on the coast of Malabar divide the day into six parts, called najika; each of these six parts is subdivided into sixty others, called venaigas; the venaiga into six birpes; the birpe into ten kenikans; the kenikan into four mattires; the mattire into eight kannimas or caignodes; which divisions, according to our mode of computation, stand as follow:

Najika,	Venaiga,	Birpe,	Kenikan,	Mattire,	Caignode.
24 min.	24 sec.	4 sec.	2-5 sec.	1-10 sec.	1-80 sec.

The day of the Chinese is begun at midnight, and ends with the midnight following. It is divided into twelve hours, each distinguished by a particular name and figure. They also divide the natural day into one hundred parts, and each of these into one hundred minutes; so that the whole contains ten thousand minutes. In the northern parts of Europe, where only two seasons are reckoned in the year, the divisions of the day and night are considerably larger than with us. In Iceland the twenty-four hours are divided into eight parts; the first of which commences at three in the morning; the second at five; the third at half an hour after eight; the fourth at eleven; the fifth at three in the afternoon; the sixth at six in the evening; the seventh at eight, and the last at midnight. In the eastern part of Turkestan, the day is divided into twelve equal parts, each of which is distinguished by the name of some animal. These are subdivided into eight keh; so that the whole twenty-four hours contain ninety-six keh.

The modern divisions of the hour in use among us are into minutes, seconds, thirds, fourths, &c. each being a sixtieth part of the former subdivision. By the Chaldæans, Jews, and Arabians, the hour is divided into one thousand and eighty scruples; so that one hour contains sixty minutes, and one minute eighteen scruples. The ancient Persians and Arabs were likewise acquainted with this division; but the Jews are so fond of it, that they pretend to have re-

ceived it in a supernatural manner: "Issachar (say they) ascended into heaven, and brought from thence one thousand and eighty parts for the benefit of the nation."

The division of the day being ascertained, it soon became an object to indicate in a public manner the expiration of any particular hour or division; as, without some general knowledge of this kind, it would be in a great measure impossible to carry on business. The methods of announcing this have been likewise very different. Among the Egyptians it was customary for the priests to proclaim the hours like watchmen among us. The same method was followed at Rome; nor was there any other method of knowing the hours until the year 293 B. C. when Papirius Cursor first set up a sun-dial in the Capitol. A similar method is practised among the Turks, whose priests proclaim, from the top of their mosques, the cock-crowing, day-break, mid-day, three o'clock in the afternoon, and twilight, being their appointed times of worship.

As this mode of proclaiming the hour could not but be very inconvenient, as well as imperfect, the introduction of an instrument which every one could have in his possession, and which might answer the same purpose, must have been considered as a valuable acquisition. One of the first of these was the clepsydra or water-clock. Various kinds of these were in use among the Egyptians at a very early period. The invention of the instrument is attributed to Thoth or Mercury, and it was afterwards improved by Ctesibus of Alexandria. It was a common measure of time among the Greeks, Indians, and Chaldæans, as well as the Egyptians, but was not introduced into Rome till the time of Scipio Nasica. The Chinese astronomers have long made use of it; and by its means divided the zodiac into twelve parts; but it is a very inaccurate measure of time, varying not only according to the quantity of water in the vessel, but according to the state of the atmosphere.

The clepsydra was succeeded by the gnomon or sun-dial.—This at first was no more than a stile

erected perpendicularly to the horizon; and it was a long time before the principles of it came to be thoroughly understood. The invention is with great probability attributed to the Babylonians, from whom the Jews received it before the time of Ahaz, when we know that a sun-dial was already erected at Jerusalem. The Chinese and Egyptians also were acquainted with the use of the dial at a very early period, and it was considerably improved by Anaximander or Anaximenes, one of whom is for that reason looked upon to be the inventor. Various kinds of dials, however, were invented and made use of in different nations long before their introduction at Rome. The first erected in that city, as has been already mentioned, was that by Parpirius Cursor; and, thirty years after, Valerius Messala brought one from Sicily, which was used in Rome for no less than ninety-nine years, though constructed for a Sicilian latitude, and consequently incapable of shewing the hours exactly in any other place; but, at last, another was constructed by L. Philippus, capable of measuring time with greater accuracy.

It was long after the invention of dials before mankind began to form any idea of clocks; nor is it well known at what period they were first invented. A clock was sent by Pope Paul I. to Pepin king of France, which at that time was supposed to be the only one in the world. A very curious one was also sent to Charles the Great from the khalif Haroun Alraschid, which the historians of the time speak of with surprise and admiration: but the greatest improvement was that of Mr. Huygens, who added the pendulum to it. Still, however, the instruments for dividing time were found to be inaccurate for nice purposes. The expansion of the materials by heat, and their contraction by cold, which cause a very perceptible alteration in the going of an instrument in the same place at different times of the year, and much more if carried from one climate to another. Various methods have been contrived to correct this; which indeed can be done very effectually at land by

a certain construction of the pendulum; but at sea, where a pendulum cannot be used, the inaccuracy is of consequence much greater: nor was it thought possible to correct the errors arising from these causes in any tolerable degree, until the late invention of Mr. Harrison's time-piece, which may be considered as making perhaps as near an approach to perfection as possible.

THE BANIAN-TREE.

This most remarkable tree is the produce of India. It is so called from the veneration it is held in by a religious sect distinguished by the appellation of banians. The branches of this tree bend down to the ground, where the slender twigs take root and grow upwards; the branches of these bend down likewise, take root, and grow up again; and by this means what was originally but one tree, will spread over a vast space of ground, and become a multitude of trees, forming by the manner of their growth very delightful arbours and arches. Thevenot saw one of these trees at Surat, which he says was very large and high, affording a most spacious shade, being of a round form and about eighty paces in diameter. The branches, which had taken root irregularly, were cut with so much art, that one might walk about underneath them, without the least inconvenience. The heathen natives frequently make use of these trees as places for their idols, and retirements for their penitentiaries and other persons, who seem in a more particular manner to be devoted to the exercise of religion.

Of one of these trees, which grows on an island in the river Nerbudda, and which is supposed to be the most stupendous production of nature in the vegetable world, the following description has been given, upon very respectable authority:

"This tree, called in India *Cubeer Burr*, in honour of a famous saint, was formerly much larger than it is

at present; for high floods have, at different times, carried away the banks of the island where it grows, and along with them such parts of the tree as had extended their roots thus far: yet what still remains is about two thousand feet in circumference, measuring round the principal stems; but the hanging branches, the roots of which have not reached the ground, cover a much larger extent. The chief trunks of this single tree amount to three hundred and fifty, all superior in size to the generality of our English oaks and elms; the smallest stems, forming into stronger supporters, are more than three thousand; and from each of these new branches, hanging roots are proceeding, which in time will form trunks, and become parents to a future progeny.

"The *Cubeer Burr* is famed throughout Hindostan for its prodigious extent, antiquity, and great beauty. The Indian armies frequently encamp round it; and at certain seasons Hindoo festivals are held here, to which thousands of votaries repair from various parts of the Mogul empire. Seven thousand persons, it is said, may easily repose under its shade; and there is great reason to believe that this is the amazing tree which Arrian describes, when speaking of the Gymnosophists, in his book of Indian Affairs.

"These people," says he, "live naked; in winter they enjoy the benefit of the solar rays in the open air; and in summer, when the heat becomes excessive, they pass their time in moist and marshy places, under large trees, which, according to Nearchus, cover a circumference of five acres, and extend their branches so far, that ten thousand men may easily find shelter under them.

"English gentlemen, when on hunting or shooting parties, are accustomed to form extensive encampments, and to spend several weeks under this delightful pavilion of foliage, which is generally filled with green wood-pigeons, doves, peacocks, bulbulls, and a variety of feathered songsters, together with monkeys, bats, &c. This tree not only affords shelter, but sustenance to all its inhabitants, being

loaded with small figs of a rich scarlet colour, on which they regale with great delight."

Milton's description of this tree, in the ninth book of his "Paradise Lost," is equally elegant and accurate.

——— "So counsell'd he, and both together went
Into the thickest of the wood; where soon they chose
The fig-tree; not that kind for fruit renown'd,
But such as at this day, to Indians known,
In Malabar or Deccan spreads her arms,
Branching so broad and long, that in the ground
The bended twigs take root, and daughters grow
About the mother tree, a pillar'd shade,
High over-arch'd, and echoing walks between:
There oft the Indian herdsman, shunning heat,
Shelters in cool, and tends his pasturing herds
At loop-holes cut through thickest shade."

OF THE SAGACITY AND ECONOMY OF THE ANTS.

This little insect the Scripture calls *exceeding wise*, and Solomon sends the sluggard to learn wisdom, foresight, care, and diligence from it: "Go to the ant, thou sluggard, consider her ways, and be wise; which having no guide, overseer, or ruler, provideth her meat in summer, and gathereth her food in the harvest." To view these busy animals (as an ingenious author observes) is really an instructive sight; for we may consider them as a little people, united, like the bees, in a republic, governed by its own laws and politics. They have usually a kind of oblong city, divided into various streets, which terminate at different magazines. Some species of ants strengthen the earth, and prevent its falling in, by incrusting it with a surface of glutinous matter; but those we commonly meet with make their habitations by amassing several splinters of wood, which they use as rafters to sustain the roof, and across these they lay another rank of splinters, covering them with dry rushes, grass, and little straw, which they raise with a double slope, to

turn off the water from their magazines, some of which are appropriated to receive their provisions, and in others they deposit their eggs, and the worms that proceed from them.—As to their provisions, they are indefatigable in bringing them home; and it is extremely curious to see one of them loaded with the kernel of some fruit, another bending under the weight of a dead gnat, or several of them at work on the carcase of a larger fly or other insect. What cannot be removed they eat on the spot, and carry to their magazines what is capable of being preserved. They sometimes carry, and sometimes push before them, grains of wheat or barley much larger than themselves; and we are told that they gnaw off the point of the grain, to prevent its shooting up by the moisture of the cells in which it is deposited.

After the ants have passed the summer in a constant employment and fatigue, they shut themselves up in winter, and enjoy the fruits of their labours; but there is reason to believe they eat little in that season, and are either benumbed or buried in sleep, like many other insects. Their industry therefore in storing up provisions does not seem so much intended to guard against the winter, as to provide a necessary sustenance for their offspring; whom they nourish, as soon as they quit the egg, with wonderful assidnity, the care of their little progeny being esteemed a matter of public concern.

Dr. King, who was very curious in examining the generation of ants, imagines their true eggs to be that fine white substance, like grains of sugar or salt, which is observable upon opening an ant-hill; for viewing a bit of it with a good microscope, and opening it with the point of a needle, he discerned many white appearances in the distinct membranes, resembling little eggs, and as clear as a fish's bladder; and what confirms his conjecture is, that he found the very same substance in the bodies of the ants themselves. This substance, when scattered, the ants diligently gather into a heap, and lie upon it in multitudes, perhaps (as Dr. Derham supposes) by way of incubation.

When the young ants leave the egg, they are little worms, no longer than common grains of sand, without any sensible motion; but, after they have received their nourishment for some time, which is distributed to them in equal proportions, they spin a thread, and wrap themselves up in a whitish web, in which state they are vulgarly taken for eggs, but are in reality aurelias or nymphs, that are to be transformed into a new progeny. And now it is truly surprising, to see with what affection and care the parent-ants carry about these aurelias; how they expose themselves to the greatest dangers rather than forsake them; how they remove them from place to place in their little hills, for the benefit of proper warmth or moisture, sometimes bringing them to the surface of the earth, or carrying them down into the ground, according as the season is warm or cold, dry or rainy: When the weather is serene, they bring them up towards the top of the hill in the morning, commonly on the side; but, on the approach of night, or cold, or the appearance of showers, they descend with their beloved charge to such a depth, that (as Dr. King observed) you may dig a foot or more before you can find them.

Of the white ant a most interesting description has been given by Mr. Henry Smeathman, in the Philosophical Transactions for 1781. According to this account, the works of these insects surpass those of the bees, wasps, and other animals, as much as those of the most polished European nations excel those of uncultivated savages; and even with respect to man, his greatest works, the boasted pyramids, fall, comparatively, far short, even in size alone, of the structures raised by these industrious insects. The labourers among them employed in this service are not a quarter of an inch in length, but the structures which they erect rise to ten or twelve feet above the surface of the earth. Supposing, therefore, the height of a man to be six feet, our author calculates that the buildings of these insects, relatively to their size and that of a man, may be considered as raised to nearly five times the height of the greatest Egyptian pyramid.

And it may be added, that with respect to the interior construction, and the various members and dispositions of the parts of the building, they certainly appear to exceed every work of human construction.

The most curious parts of these structures are, the royal apartments, nurseries, magazines of provision, arched chambers and galleries, with their various communications; the ranges of Gothic-shaped arches, projected, and not formed by mere excavation, some of which are two or three feet high, but which diminish rapidly, like the arches of aisles in perspective; the various roads, sloping staircases, and bridges, consisting of one immense arch, and constructed to shorten the distance between the several parts of the building, which would otherwise communicate only by winding passages.

The economy of these insects appears to have been very minutely observed by an ingenious author; who informs us, that there are three distinct ranks or orders among them, constituting a well regulated community. These are, first, the *labourers* or working insects; next, the *soldiers*, or fighting class, which do no kind of labour, and are much larger than the former; and, lastly, the winged or perfect insects, which may be called the *nobility* of the state; for they neither labour nor fight, being scarcely capable even of self defence. These only are capable of being elected *kings* or *queens;* and Providence has so ordered it, that they emigrate within a few weeks after their elevation to the sovereignty, and either establish new kingdoms, or perish within a day or two.

The first order, the working insects, are most numerous; being in the proportion of a hundred to one of the soldiers. In this state they are only about a quarter of an inch long, and so extremely small, that twenty-five of them will scarcely weigh one grain.

The second class, or soldiers, have a very different form from the labourers, and have been by some authors supposed to be the males, and the former neuters; but they are, in reality, the same insects as the foregoing, only they have undergone a change of form,

and approached one degree nearer to the perfect state. They are about half an inch long, and equal in bulk to fifteen of the labourers.

The third order, or the insect in its perfect state, varies its form still more than ever. The head, throat, and belly, differ almost entirely from the same parts in the labourers and soldiers; and besides this the animal is now furnished with four large, transparent wings, with which it is, at the time of emigration, to wing its way in quest of a new settlement. These are equal in bulk to two soldiers and about thirty labourers; and by means of the wings with which they are furnished, they roam about for a few hours; at the end of which time they lose their wings, and become the prey of innumerable birds and reptiles: while scarcely one pair out of many millions of this unhappy race get into a place of safety, fulfil the first law of nature, and lay the foundation of a new community.

The few fortunate pairs who survive this annual destruction are casually found by some of the labourers, and are elected kings and queens of new states. By these industrious creatures the king and queen elect are immediately protected and enclosed in a chamber of clay where the business of propagation soon commences. Their voluntary subjects then busy themselves in constructing nurseries, or apartments, entirely composed of wooden materials, and seemingly joined together with gums. Into these they afterwards carry the eggs produced from the queen; and here the young are attended, after they are hatched, until they are able to shift for themselves.

From the many singular accounts given of the police of these insects, we shall mention one respecting the different functions of the labourers and soldiers, or the civil and military establishments in this community, on an attempt to explore their nest.

On making a breach in any part of the structure with a hoe or pick-axe, a soldier immediately appears, and walks about the breach, as if to see whether the enemy be gone, or to examine whence the attack proceeds. In a short time he is followed by two or three

others, and soon afterwards by a numerous body, who rush out as fast as the breach will permit; their numbers increasing as long as any one continues to batter the building. During this time they are in the most violent bustle and agitation; while some of them are employed in beating with their forceps upon the building, so as to make a noise that may be heard at three or four feet distance. On ceasing to disturb them, the soldiers retire, and are succeeded by the labourers, who hasten in various directions towards the breach, each with a burden of mortar in his mouth ready tempered. Though there are millions of them they never stop nor embarrass each other; and a wall gradually rises that fills up the chasm. A soldier attends every 600 or 1000 of the labourers, seemingly as a director of the works; for he never touches the mortar either to lift or carry it. One in particular places himself close to the wall which they are repairing, and frequently makes the noise above-mentioned; which is constantly answered by a loud hiss from all the labourers within the dome: and at every such signal, they evidently redouble their pace, and work as fast again.

The work being completed, a renewal of the attack constantly produces the same effects. The soldiers again rush out, and then retreat, and are followed by the labourers loaded with mortar, and as active and diligent as before. "Thus," says our author, "the pleasure of seeing them come out to fight or to work alternately may be obtained as often as curiosity excites or time permits; and it will certainly be found that the one order never attempts to fight, nor the other to work, let the emergency be ever so great. The obstinacy of the soldiers is very remarkable: they fight to the last extremity, disputing every inch of ground so effectually as often to drive away the negroes who are without shoes, and make Europeans bleed plentifully through their stockings.

Many curious and striking particulars are related of the great devastations committed by this powerful community, which construct roads, or covered ways,

diverging in all directions from the nest, and leading to every object of plunder within their reach. Though the mischiefs they commit are very great, yet such is the economy of nature, that these are counterbalanced by their destruction of dead trees, and other substances, which, by a tedious decay, would only serve to encumber the face of the earth. Such is their alacrity and dispatch in this office, that the total destruction of deserted towns is so effectually accomplished, that in two or three years a thick wood fills the space; and not the least vestige of a house is to be discovered.

ON THE ECONOMY OF THE BEE.

With respect to the form of the bee, it is divided by two ligaments into three parts, the head, the breast, and the belly. The head is armed with two jaws and a trunk, the former of which play like two saws, opening and shutting to the right and left. The trunk is long and taper, and extremely pliant and flexible, being destined by nature for the insect to probe to the bottom of flowers through all the impediments of their chives and foliage, and drain them of their treasured sweets. But were this trunk to be always extended, it would prove incommodious, and be liable to be injured by a thousand accidents; it is therefore of such a structure, that, after the performance of its necessary functions, it may be contracted, or folded up: and besides this, it is fortified against all injuries by four strong scales, two of which closely sheath it, and the two others, whose cavities and dimensions are larger, encompass the whole.

From the middle part or breast of the bee grow the legs, which are six in number; and at the extremities of the paws are two little hooks, discernible by the microscope, which appear like sickles with their points opposite to each other. The wings are four, two greater and two smaller, which not only serve to transport them through the air, but by the noise they make, to

give notice of their departure and arrival, and to animate them mutually to their several labours. The hairs, with which the whole body is covered, are of singular use in retaining the small dust that falls from the chives of the flowers. The belly of the bee consists of six rings, which slide over one another, and may therefore be lengthened or contracted at pleasure; and the inside of this part of the body contains the intestines, the bag of honey, the bag of poison, and the sting. The office of the intestines is the same as in other animals. The bag of honey is transparent as crystal, containing the sweet juices extracted from flowers, which the bee discharges into the cells of the magazine for the support of the community in winter. The bag of poison hangs at the root of the sting, through the cavity of which, as through a pipe, the bee ejects some drops of this venemous liquor into the wound, and so renders the pain more excessive.

The mechanism of the sting is admirable, being composed of two darts, inclosed within a sheath that tapers into a fine point, near which is an opening to let out the poison. The two darts are ejected through another aperture, which, being armed with several sharp beards like those of fish-hooks, are not easily drawn back again by the bee; and indeed she never disengages them, if the wounded party happens to start and put her into confusion; but if one can have patience to continue calm and unmoved, she clinches those lateral points round the shaft of the dart, by which means she recovers her weapon, and gives less pain to the person stung. The liquor, which at the same time she infuses into the wound, causes a fermentation, attended with a swelling, which continues several days; but that may be prevented by immediately pulling out the sting, and enlarging the puncture, to let the venemous matter have room to escape.

We must now consider the generation, polity, and labours of these insects, the true knowledge of which has resulted in a great measure from the modern invention of glass hives, through which all the secrets of the community are laid open to a curious observer.

Any person who carefully examines a hive, at different seasons of the year, will distinguish three sorts of bees; of which the greater number are the common working bees, who do all the business of the hive, and seem to be neither male nor female. The second sort, called drones, are the males, which are somewhat larger, have no sting, nor ever stir from the hive, but live upon the honey prepared by the others. The third sort is a much larger and longer-bodied bee, of which there is often but one in a hive, at least but one in every swarm or colony of young bees, who are from time to time detached from the hive in search of another habitation. This large bee is what the ancients called the king, from the respect they always saw paid to it by the other bees; but being a female, the moderns more properly give it the title of queen, or mother of the swarm.

Mr. Reaumur, desiring to try how far the accounts given of the homage paid by the others to the queen-bee was true, caused a swarm of bees to be swept down into a glass-hive. Among these there was one female, which was soon distinguished by her shape, and the shortness of her wings. For some time she walked alone at the bottom of the hive; the rest seeming to regard nothing but their own safety. The female, after going twice or thrice up the sides of the hive, to the top of it, where they were hung, at last went in among the cluster, and brought down about a dozen with her. Attended with these, she walked along slowly at the bottom of the hive. But the rest continuing at the top, she went again and again, till they all came down and formed a circle about her, leaving her a free passage wherever she turned to walk, and feeding her with the honey they had gathered for themselves.

While the hive is sufficient to contain the bees without inconvenience, the society live peaceably together; but when the numbers are multiplied so that their habitation is too small, the young brood quit the place of their nativity, and fly in quest of a new settlement. The swarm that goes out consists of the common bees, under the conduct of one female or queen; or if two

queens come out of the same hive, then the body of common bees divides into two parts, each following one female: both parties, however, when they alight out of the air, usually settle near each other on a branch of a tree; and then those bees which form the smallest swarm go off, one by one, to the other cluster, deserting the queen they followed, who is at length murdered by her subjects. The swarm being thus united and hanging down from the tree, the countrymen, who are always vigilant on these occasions, provide for their accommodation a hive rubbed with balm, thyme, and other odoriferous herbs, into which they gently brush them from the branch, and carry them to a stand prepared for that purpose. All this the bees bear very patiently, and after they are a little composed, they begin to think of forming themselves convenient apartments in their new habitation.

When they set about this work, it is observed that they divide themselves into four bands, one of which flies into the fields to provide materials for the structure; the second works upon these materials, and forms them into a rough sketch of the dimensions and partitions of the cells; the third band examines and adjusts the angles, removes the superfluous wax, polishes the work, and gives it its necessary perfection; and the fourth is employed in bringing provisions to the labourers. M. Maraldi takes notice, that the bees employed in polishing the combs, work longer than those that build them, because polishing is not so laborious. They begin their work at the top of the hive, continuing it downwards to the bottom, and from one side to another; and to make it the more solid, they use a sort of tempered wax, which is pretty much like glue. The form of the cells of the honey-comb is hexagonal, which figure, besides what is common with a square and equilateral triangle, has the advantage of including a greater space within the same surface. The best mathematician, indeed, could not have chosen a more proper figure than the bees do for such a combination of apartments; for although circular cells would have been the most capacious, this would by no

means have been a convenient figure, because much of the room would have been taken up by vacancies between the circles. It was therefore necessary to make use of some of the rectilinear figures, amongst which the only proper ones were the triangle, the square, and the hexagon; and the bees wisely chose that figure which consisted of most angles, as supposing it the most capacious.

The expedition of the bees in their labour is almost incredible; for, notwithstanding the elegance and just proportions of their work, they are so indefatigable, that in one day's time they will finish a honey-comb a foot long and six inches broad, capable of receiving three thousand bees. When the cells are completed, the queen takes possession of those she likes best, to deposit her eggs in, and the rest are left to be filled with honey. She lays one egg in each cell, and sometimes more than a hundred in a day: but what is most remarkable, as some affirm, she lays those eggs which are to produce common bees in cells of the common shape and size, those that are to become drones or males in larger cells, and in two or three great cells of a circular form, she deposits those which are to be females like herself. These eggs, having lain a short time in the cells, are hatched into white maggots, and are fed with honey for ten or twelve days, after which the other bees close up the cells with a thin piece of wax: and under this covering they become gradually transformed into bees, in the same manner as silk-worms are changed into butterflies. Having undergone this metamorphosis, the young bees pierce through their waxen doors, wipe off the humidity from their little wings, take their flight into the fields, rob the flowers of their sweets, and are perfectly acquainted with every necessary circumstance of their future conduct.—As to the males or drones, which are destined only to propagate their species, they live very comfortably for about three months after they are hatched; but when that time is over, and the females are impregnated, the common bees either kill them or drive

them from the hive as burdensome to the community, and not a drone is to be found till the next season.

Of the reciprocal affection subsisting between the queen and the working bees, we find a most interesting account in Mr. Warder's Monarchy of Bees, the substance of which we shall lay before our readers.

"Many years ago," says our author, "I wished to satisfy my curiosity respecting the queen bee, and was resolved to hazard the destroying of a single swarm for that purpose. One morning, about half an hour before sun-rise, I took a swarm of bees that had been hived the day before, and carried it into a meadow near my garden; and there, with a smart stroke, shook out all the bees in a lump upon the grass. After they had recovered from the confusion which so violent a motion produced among them, I laid down on the ground, and, with a little stick, gently stirred among them, in order to find the queen. I at length discovered her, and, shutting her in a box, carried her into my apartment, where I let her fly, and a few of the other bees, which I had taken along with her. They, as was natural, flew against the window. I therefore cut off one of her wings, and again shut her up in the box.

"I was now desirous to know how the other bees would act in the absence of their queen; and this I soon observed.—As soon as they discovered that she was not among them, they scattered themselves about in all directions, running up and down with a most piteous and discontented note, in search of her. They spent about an hour in this fruitless search; after which they took wing, and alighted on a hedge at a little distance. This was the hedge where the same swarm had pitched the morning before; and it almost appeared as though they had gone to search for her in a place where they recollected having been but a little time ago, in company with her. And now, instead of collecting themselves into a bunch, as is their custom when the queen is present, they scattered themselves along the hedge for many yards, in little parties of forty or fifty together.

"Being desirous of knowing whether they would again acknowledge their crippled sovereign, I took the box from my pocket, and, having opened it, laid it on the bank, when the little wanderers immediately collected round it. Having thus found their queen again, they now continued in a cluster about her, and seemed perfectly happy and contented.

"Night coming on, I again hived them, and next morning knocked them out in the meadow as before; when they soon united themselves together about their sovereign. In this state I permitted them to continue for some hours, to observe whether they would rise; but in this the strength of their loyalty was fully evinced; for as the poor queen was unable to lead them to any place for their common preservation, her subjects chose rather to perish with her than to forsake her in distress.

"I again shut up the queen in my box: when the other bees, as before, spread themselves in every direction in search of her. Whilst they were in this situation, I put her down on one side of them: they all, in a moment, ceased their search, and advanced immediately towards her. Before she was quite concealed, I took her up, and put her in another place; when the bees all turned directly toward her again. After repeating this experiment a few times more, I suffered them to close round her. In this affecting situation they continued for the remainder of the day, not one of them offering to desert her, though by this time they must certainly have been very much in want of food. In the evening I hived them as before.

"On knocking them out the next morning, I formed a resolution of trying to what length these loyal creatures would carry their affection. They had now tasted no food for two days; and their queen had at least equalled them in this; for though I had repeatedly offered her some honey, she would not even taste it without her beloved subjects. But to draw this curious, though melancholy narrative to a conclusion, I must observe that they still retained their integrity, and even famine itself could not diminish their affec-

tion; for, after living five days and nights without the least sustenance, they all died of hunger. The queen existed a few hours longer than the rest, but at length surrendered a life which the destruction of her friends had rendered comfortless and insupportable."

The method in which the bees collect their wax and honey deserves to be explained, and is particularly worthy of attention.—At the bottom of all flowers there are certain glands which contain more or less honey, that is, the most exalted particles of the sugary juices of the plant. These juices the bee sucks up with its proboscis or trunk, and draws it into its mouth; and when it has thus taken a sufficient quantity into its stomach, it returns to the hive, and discharges the honey into the common magazine. When the cells prepared to receive it are full, the bees close up some with wax till they have occasion for the honey; the rest they leave open, to which all the members of the society resort, and take their repast with great moderation.

It is an excellent observation of a modern author, that the hive is a school to which numbers of people ought to be sent: for prudence, industry, benevolence, patriotism, economy, neatness, and temperance, are all visible among the bees. These little animals are actuated by a social spirit, which forms them into a body politic, immediately united, and perfectly happy. They all labour for the general advantage; they are all submissive to the laws and regulations of the community; having no particular interest, nor distinction, but those which nature or the necessities of their young have introduced amongst them. We never see them dissatisfied with their condition, or inclinable to abandon the hive in disgust, at finding themselves slaves or necessitous. On the contrary, they think themselves in perfect freedom and perfect affluence; and such indeed is their real condition. They are free, because they only depend on the laws; and they are happy, because the concurrence of their several labours inevitably produce an abundance, which contributes to the riches of each individual. Human societies, com-

pared with this, will appear altogether monstrous; for although necessity, reason and philosophy have established them for the commendable purposes of mutual aid and benefit, a spirit of selfishness too often destroys all; and one half of mankind, to load themselves with superfluities, leave the other destitute of common necessaries.

Naturalists have generally asserted, that the fine dust of the apices of flowers, collected amongst the hairs of the bee, which nature seems to have clothed it with for that purpose, was afterwards converted into wax; and some of the moderns, as well as the ancients, have imagined wax to be the excrement of this laborious insect: but the judicious Boerhaave supposes it to be a juice issuing from the leaves of plants, and adhering to their surface, where it is inspissated by the heat of the sun, as may be seen in rosemary by the help of a microscope. This the bees collect with their fore feet and jaws, and roll up into little balls, which they convey, one at a time, to the feet of their middle legs, and from thence to the middle joint of their hind legs, where there is a small cavity, like a spoon, to receive the burden.—When those bees who are employed in collecting the wax return to the hive, they are assisted by their companions in discharging their load, who by little and little pick off the wax from their legs and carry it to the common treasure. With this they build their combs, observing a wonderful frugality, not the least grain of it being wasted or neglected.

Thus, as an ingenious author observes, their indulgent Creator has given them all implements necessary, either for building their combs, or composing their honey. They have each a portable vessel, in which they bring home their collected sweets; and they have the most commodious store-houses, wherein they deposit them. They readily distinguish every plant, which affords materials for their business: and are complete practitioners in the arts of separation and refinement. They are aware, that the vernal bloom and summer sun continue but for a season, and are therefore eager to improve every shining hour, and lay up a stock

sufficient to supply the whole state, till the return of their flowery harvest.

Bees are extremely solicitous to remove such insects or other foreign bodies as happen to get admission into the hive. When so light as not to exceed their powers, they first kill the insect with their stings, and then drag it out with their teeth. But it sometimes happens, that a snail intrudes upon their retirement, and, although it is soon stung to death, the bees are incapable of removing so heavy a burden. To prevent the noxious odours, therefore, which might result from the animal's putrefaction, they immediately cover every part of its body with propolis, through which no effluvia can escape. When a snail with a shell gets entrance, it is disposed of with much less trouble; for as soon as it receives the first wound from a sting, it naturally retires within its shell; and the bees, by glueing all round the margin of the shell, render it for ever immoveable.

Almost every one knows the great and various uses of wax and honey, the consumption whereof, throughout the several parts of Europe, is incredible; and if honey were more used than it is, instead of sugar, it would be found of excellent service. Being very penetrating and deterging it is good in all obstructions, especially from viscid and tough humours. It wonderfully promotes expectoration; nor is there any disorder arising from phlegm, or the produce of a cold constitution, in which it is not serviceable. But it is to be observed, that there is a peculiarity in some constitutions, which renders them incapable of bearing the least quantity of honey, without sickness and great uneasiness. In surgery, it is used to cleanse foul ulcers, either by immediate application, or washing them with liquors in which it has been dissolved.

Considering therefore the advantages arising from the labours of bees, is it not strange that our country-people are not more solicitous about the preservation and increase of these animals? It is certain they would multiply prodigiously with proper management; and we might, upon a moderate computation, have

five thousand times as much wax and honey produced in this kingdom as we have at present. But instead of taking due care to keep them warm in winter, and to supply them with a sufficient quantity of food, vast numbers are suffered to perish annually; and still greater numbers are destroyed with the loss of an immense future progeny, by smothering whole swarms in the hive, in order to obtain the honey.

CATHEDRAL OF ST. PETER'S, ROME.

This church is esteemed a master-piece of modern architecture, and strikes the spectator with admiration and pleasing astonishment. The circular area which lies before this magnificent edifice is encompassed by a beautiful peristyle or colonnade, consisting of two hundred and eighty-four marble pillars of the Doric order, which support an architrave, adorned with a vast number of statues of saints and martyrs. The obelisk and a fine fountain on each side of it, are great additions to the beauty of this spacious court, from whence there is a flight of steps to a grand terrace, that leads into the lofty portico before the church. Over this portico, which is supported by pillars eighteen feet in circumference, are the statues of our Saviour, and the twelve apostles; and there is also a fine balcony, where the popes are crowned in view of all the people. The body of the church, as well as the cupola, which is adorned with curious mosaic work, is sustained by large square pillars, like those of St. Paul's cathedral in London; and under the middle of the cupola stands the high altar, which is ninety feet in height, being a kind of pavilion, supported by four wreathed columns of brass, adorned with foliage; and on the top of the canopy are four angels of gilt brass, holding festoons of flowers most beautifully carved; and between them are figures of children playing on the cornice. The ascent to the dome is by a winding stair-case, and from thence to the ball by an incom-

modious flight of stairs, which lies between the outer and inner dome. The height from the pavement to the top of the cross is four hundred and thirty-two feet, and the diameter of the ball is eight feet four inches. St. Peter's chair is made of gilded brass, and supported by four gigantic figures, representing four fathers of the church, with a glory over them, extending quite to the roof. Under this chair is an altar, and on each side are stately monuments of brass and marble, of excellent workmanship. It is scarcely possible to describe the riches and beauty of the little chapels and altars round this church; yet the gilding, carving, paintings, embossed work, brass and marble statues, &c. are so well contrived and disposed, that the abundance occasions not the least confusion, nor does any thing appear superfluous. But among all the ornaments of this cathedral, none deserve our attention more than the mosaic pictures which represent several pieces of scriptural and ecclesiastical history, and exceed any thing of that kind that ever was done by the ancients.

Here it may be proper to inform the reader, that mosaic work is an assemblage of little pieces of glass, marble, or precious stones, of various colours, cut square, and cemented on a ground of plaster, imitating the natural colours and degradations of painting. In this sense it includes inlaid work, veneering, &c.; but in its more proper and restrained sense it only comprehends works of stone, metals, and glass, those of wood being distinguished by the name of marquetry. The mosaic of marble, which at present is most in use, serves for the pavements of churches and palaces, and the incrustations of the walls of the same edifices; but that of precious stones is so expensive, that it is seldom used unless in small works, such as ornaments for altar-pieces, rich tables, &c. The mosaic work so much admired in St. Peter's is done with coloured glass, which kind, though now little used, is extremely brilliant and durable. It is laid on a sort of plaster composed of lime, fine brick-dust, gum-tragacanth, the whites of eggs, and other ingredients; the pieces

of glass being arranged with so much justness, and the light and shadow so well observed, that they appear as smooth as a table of marble, and as highly finished as a painting in Fresco, with this advantage, that they have a fine lustre, and will last almost for ever, whereas time effaces all other kinds of painting.—There is another sort of mosaic work, of a more modern invention than any of the former, made with a kind of gypsum or talc, found in the stone quarries near Paris. Of this talc, calcined in a kiln, beaten in a mortar, and sifted, they form a sort of artificial marbles, imitating precious stones, and of these compose a mosaic work, little inferior to the natural stones either in point of lustre or durability.

Mr. Smollet, speaking of this church, in his travels through Italy, says, " the piazza is altogether sublime. The double colonnade on each side extending in a semi-circular sweep, the stupendous Egyptian obelisk, the two fountains, the portico, and the admirable façade of the church, form such an assemblage of magnificent objects as cannot fail to impress the mind with awe and admiration: but the church would have produced a still greater effect, had it been detached entirely from the buildings of the Vatican. It would then have been a master-piece of architecture, complete in all its parts, entire and perfect: whereas, at present, it is no more than a beautiful member attached to a vast undigested and irregular pile of building. The great picture of mosaic work, and that of St. Peter's bark, tossed by the tempest, which appear over the gate of the church, though rude in comparison with modern pieces, are nevertheless great curiosities, when considered as the work of Giotto.

The tribune of the great altar, consisting of four wreathed brass pillars, gilt, supporting a canopy, is doubtless very magnificent, but rather over-charged with sculpture, fluting, foliage, festoons, and figures of boys and angels, which with the hundred and twenty-two lamps of silver continually burning below, serve to dazzle the eyes, and kindle the devotion of the igno-

rant vulgar, rather than to excite the admiration of a judicious observer.

There is nothing, however, in this famous structure, so worthy of applause, as the admirable symmetry and proportion of its parts. Notwithstanding all the carving, gilding, basso-relievos, medallions, urns, statues, columns, and pictures, with which it abounds, it does not, on the whole, appear over crowded with ornaments. When you first enter, your eye is filled so equally and regularly, that nothing appears stupendous, and the church seems considerably smaller than it really is. The statues of children, that support the fonts of holy-water, when observed from the door, seem, to be of the natural size; but as you draw near, you perceive they are gigantic. In the same manner, the figures of the doves, with olive-branches in their beaks, which are represented on the wall, appear to be within your reach; but as you approach them, they recede to a considerable height, as if they had flown upwards to avoid being taken.

INUNDATION OF THE NILE, &c.

The river Nile has always been reckoned one of the greatest wonders of Egypt, and it is chiefly to this that the country owes its abundant fertility; for, as it seldom rains in the inland parts, and the soil is naturally dry and sandy, if the lands were not annually watered by the overflowing of this river, Egypt, instead of the most fruitful, would be one of the most barren regions in the world.

The sources or springs of this famous river were absolutely unknown to the ancients; and the discovery of them having been repeatedly attempted in vain, was deemed so honourable an enterprize, that Lucan makes Cæsar speak to this effect:

"Long has my curious soul, from early youth,
Toil'd in the noble search of sacred truth;
Yet still no views have urged my ardour more,
Than Nile's remotest fountain to explore;

Then say what source the famous stream supplies,
And bids it at revolving periods rise;
Show me that head from whence, since time begun,
The long succession of his waves has run:
This let me know, and all my toils shall cease,
The sword be sheathed, and earth be blest with peace."

Mr. Bruce informs us, that the sources of the Nile are situated in the country of the Agows, in Abyssinia, and that the longitude of the principal fountain is thirty-six degrees, fifty-five minutes, thirty seconds east from Greenwich. The place through which is the passage to the territory of the Agows, is called Abala; a valley, generally about half a mile, and never exceeding one mile, in breadth. The mountains which surround it are at first of an inconsiderable height, and covered to their very summits with trees and herbage, but as they proceed to the southward they become more rugged. Those to the west join a mountain called Asormaska, where they turn to the south, and enclose the territory of Sacala, which lies at the foot of them; and further to the westward is the small village of Geesh, where the fountains of the Nile are situated.

Having passed several considerable streams, all of which empty themselves into the Nile, Mr. Bruce found himself obliged to ascend a very steep and rugged mountain, where no path appeared but a very narrow one made by the sheep, and rendered almost impassable by thorny plants, and a number of large stones which seemed to have remained there ever since the creation. At length, however, he reached the top, and had a sight of the Nile immediately bebelow him; but so diminished in size, that it now appeared only a brook scarce sufficient to turn a mill. The village of Geesh is not within sight of the fountains of this river, though not more than six hundred yards distant from them. The country about that place terminates in a cliff of about three hundred yards high, which reaches down to the plain of Assoa, continuing in the same degree of elevation till it meets the Nile again about seventeen miles to the southward.

In the middle of this cliff is a large cave, running straight northward, with several bye-paths, forming a natural labyrinth, which seems capable of containing the inhabitants of the whole village, together with their cattle. Into this cave Mr. Bruce advanced about a hundred yards; but did not chuse to go further, as the candle he carried with him seemed ready to go out, and the people assured him that there was nothing remarkable to be seen at the end.

From the edge of the cliff of Geesh, above the village, the ground slopes on the northward with a regular descent to a triangular marsh upwards of eighty-six yards broad; and about the middle of this marsh rises a circular hillock, about twelve feet in diameter, and surrounded by a shallow trench which collects the water, and sends it off to the eastward. This is firmly built of sod, and kept in repair by the Agows, who worship the river, and perform their religious ceremonies upon this, as an altar. In the midst of it is a circular hole, which is always kept clear of grass and aquatic plants, and the water in it is perfectly pure and limpid, but without any ebullition or visible motion on its surface. The mouth is rather less than three feet diameter, and at the period of our traveller's first visit (Nov. 5, 1770), the water stood about two inches from the brim, nor did it either increase or diminish during all the time of his residence in the neighbourhood. On putting down the shaft of a lance, he found a feeble resistance, at the depth of six feet four inches, as if from grass and rushes; and about six inches deeper, he found his lance had entered into soft earth, but met with no obstruction from stones or gravel; and the same was confirmed by using a heavy plummet with a line besmeared with soap.—This is the first fountain of the Nile.

The second fountain is situated about ten feet distant from the former, and is only eleven inches in diameter, but eight feet three inches deep.—The third is about twenty feet from the first; the mouth being rather more than two feet in diameter, and five feet eight inches in depth. These fountains are used as altars,

and from the foot of each issues a running rill, which uniting with the water of the first trench, goes off at the east side in a stream that would fill a pipe of about two inches diameter. The water of these fountains is extremely light and intensely cold, though exposed to the scorching heat of the sun without any shelter. The elevation of the ground must be very great, as the barometer stood only at twenty-two inches, "neither," says Mr. Bruce, "did it vary from that height any of the days I staid at Geesh, and thence I inferred, that at the sources of the Nile, I was more than two miles above the level of the sea;—a prodigious height to enjoy a sky perpetually clear, as also a hot sun, never overcast with clouds from rising to setting."

The Nile, thus formed by the union of streams from these three fountains, runs eastward through the marsh for thirty yards, with a very little increase of water, but perfectly visible, till it is met by the grassy bank of land declining from Sacala. This turns it round gradually to the north-east and then due north; and in the two miles it flows in that direction, the river receives many small contributions from springs that rise in the banks on each side of it, so that about this distance from the fountains, it becomes a stream capable of turning a common mill.

From this spot the Nile turns to the westward, and after running over loose stones occasionally in that direction about four miles farther, a fall commences of about six feet in height, after which it quits the mountainous place of its nativity, and issues into the plains of Goutto. Here it flows so gently that its motions can scarcely be perceived, but, at the same time, it makes so many sharp unnatural windings, that it differs from any other river we ever saw; making about twenty sharp angular peninsulas in the course of five miles, through a marshy plain of clay, quite destitute of trees, and very unpleasant. After passing this plain, it turns due north, and receives the tribute of several small streams which descend from the mountains of Afotmasha. It now begins to run rapidly, and again receives a number of beautiful rivulets, which

have their rise in the heights of Litchambara. Here it becomes a considerable stream, inclining to the north-east, and winding exceedingly till it is joined by the small river Diva. The mere names of places through which it passes cannot be expected to afford any amusement to our readers; suffice it therefore to observe, that after washing Upper and Lower Egypt, it at last disembogues itself into the Mediterranean.

The native country of the Nile being now discovered, the cause of its inundation is manifest. To say nothing of the false conjectures that have been made about it, it is now universally allowed to be occasioned by the great rains that fall in Ethiopia during the months of April and May, whereby the river is so swelled as to lay that country almost entirely under water, and afterwards Egypt in its course towards the Mediterranean. Nor is this inundation peculiar to the Nile, but common to it with other rivers that have their rise or course between the tropics, where heavy rains constantly fall at a certain season of the year, which cause them to break through their ordinary bounds, and overflow the adjacent countries in their passage to the sea, particularly in Siam, Bengal, and other parts of the East Indies. The northern winds, called Etesian by the ancients, as blowing annually during a certain time, have been likewise supposed to contribute not a little to the overflowing of the Nile, by retarding its course, and forcing the sea against the mouth of the river; but, if these winds have any such effect, it must be inconsiderable, as Ludolphus observes, though he allows they may render the increase somewhat unequal, as they blow weaker or stronger.

These rains being undoubtedly the cause of the Nile's overflowing, let us now consider its gradual rise, and the beneficial effects it produces. The Nile begins to swell in the month of May, but its increase is not considerable in the Lower Egypt till about the 20th of June, nor is any public notice taken of it till the 28th of that month, at which time it is usually risen five or six peeks, a Turkish measure equal to about five and twenty inches. Being come to this height, the public

criers proclaim the rise of the river in the city of Cairo, and continue to publish how much it increases every day, till it rises to sixteen peeks, at which time they make great rejoicings; and this usually happens at the latter end of July, or before the 20th of August; but the sooner it happens, they have the greater hopes of a plentiful season. If the Nile do not rise to sixteen peeks, the people pay no tribute that year to the grand Signior; but a still greater height is necessary to cause a general flood, and prepare the lands for cultivation. Eighteen peeks (Dr. Pococke informs us) are reckoned but an indifferent Nile, twenty a middling one, and twenty-two a very good one, beyond which it seldom rises. If it chance to rise higher than twenty-four, the inundation is said to be prejudicial, the waters in that case not retiring soon enough for the people to sow their corn; but we scarce know any instance of this nature. The Nile is usually at its greatest height about the middle of September.

In order to know exactly the rise of the Nile, there is built, on a pleasant island opposite to old Cairo, a place called the Makkias, in which is a famous pillar for measuring the Nile. It is fixed in a deep bason, the bottom of which is on a level with the bed of the river, the water passing through it. This pillar, which is placed under a dome, and crowned with a Corinthian capital, is divided into measures, for observing the rise of the waters; and from the court that leads to the house is a descent to the Nile, by steps, on which the common people believe that Moses was found after he had been exposed on the banks of the river.

As the river cannot of itself overflow the lands every where in the necessary proportion, the people have cut, with incredible labour, a vast number of canals and trenches from one end of Egypt to the other, so that almost every town and village has its canal, which is opened at the proper time, and conveys the water of the Nile to distant places. It is from these canals, where the banks of the Nile are high, that the lands are overflowed; but it is otherwise where they are low, particularly in the Delta, which is that part of Egypt

that lies between the two mouths of the river. Canals are carried along the higher grounds, that the water may have a fall from them to the lower parts; and from the great canals it is drawn out into small channels, and conveyed all over the country. It is likewise observable, that, as they have dikes or banks to keep the water out of the canals till the river be risen to a proper height to let it in, so in some of them they have contrivances to keep it in after the Nile is fallen, and also preserve it in certain lakes or ponds, from whence they can let it out upon their lands at pleasure.

The reader, however, is to understand, that some parts of the country lie too high to be watered by means of the canals, and several gardens and plantations require more refreshment than what they receive from the annual inundation; and on this account they are obliged to raise water from the river, which is lodged in cisterns or reservoirs contrived for that purpose. This is generally done by the Persian wheel, a machine turned by oxen, which carries a rope hung with several vessels, that fill as it goes round, and empty themselves at top into the reservoir. They have another contrivance where the bank of the river is high; in which case they make a bason on the side of it, fixing near it an upright pole, and across the top of that another with an axle, at one end whereof hangs a great stone, and at the other a leathern bucket, which, being drawn down into the water by two men, is raised up again by the weight of the stone, the men directing it, and emptying it into the bason. The former of these machines is chiefly used in the lower parts of Egypt, the latter in the higher; for, as we advance up the river, the difficulty of raising the water increases.

We may judge how much the fertility of Egypt is owing to the inundation of the Nile, when we consider that it leaves behind it a stratum of mud or slime, which, without any other manure, renews all the strength of the soil that the preceding harvest had impaired; nay, it is frequently found necessary to temper it with a little sand, to abate its excessive richness. And here it is worth observing, that the surface of the

ground must have been considerably raised, in a long course of years, by these repeated accessions of mud and slime, so that formerly a less rising of the Nile was sufficient to overflow the country than at present. As to the quantity of mud thus annually left by the river, it is a point not easy to determine; but Dr. Shaw supposes that the surface of the land of Egypt is thereby raised somewhat more than a foot in a hundred years; according to which computation, the perpendicular accession of soil from the deluge to the present time must have been about forty-two feet. And hence the doctor imagines, that in process of time the whole country may be reduced to the greatest barrenness, by being raised so high that the river will not be able to overflow its banks. But Dr. Pococke is of another opinion, as supposing that a great quantity of soil is annually carried off in the productions of the earth, (which in Egypt is not supplied by manuring) and that the bed of the Nile may be raised by the subsiding of the heavier sandy particles; for which reason he thinks it improbable that the land will ever rise to such a height, as to be deprived of the usual inundations. He observes, however, if that should ever be the case in the Lower Egypt, the inhabitants would only be in the condition of those of Upper Egypt, who are obliged to raise the water by art and labour.

With respect to the distribution of the waters of the Nile by means of canals, &c. we shall only add, that there is a great canal called Khalis, which runs from the river quite through the city of Cairo, and several miles beyond it. Near the mouth of this canal there is a mound or mole, which is every year broken down with great solemnity and rejoicing, when the Nile rises to the height of sixteen peeks; and thereby the water is conveyed into the city, and from thence into the gardens and the adjacent country. The bashaw himself accompanied by all his great officers, and attended by a vast multitude of people, assists at the ceremony of cutting this bank; and on this occasion the trumpets and other music, the repeated shouts of the people, the firing of guns, &c. make an agreeable confusion.

In short, bonfires, illuminations, fireworks, several sorts of games and exercises, and whatever can express an universal joy, are continued for three days and nights successively. M. Thevenot, who was twice present at this ceremony, tells us, that among other diverting sights exhibited on that occasion, he saw two swimmers, whose performances were very surprising. One of these, with his hands tied behind him, and his feet bound with a chain weighing ten pounds, stood upright in the water, and in that manner went from the opening of the canal quite through Cairo, which is three miles and upwards. The other fellow swam in chains from one end of the canal to the other, with a pipe in his mouth, and a dish of coffee in his hand, without spilling it; and both these swimmers were handsomely rewarded.

Before we leave the Nile it is proper to take notice of its famous cataracts, which are usually reckoned seven in number, where the river pours itself down high precipices, with such a prodigious noise, that it may be heard at the distance of several leagues. De l'Isle represents one of them as falling from a height of two hundred feet, with a noise exceeding that of the loudest thunder; and it is said the water breaking with the fall, raises such thick mists, that at a distance they appear like clouds. It is also reported that the water in its fall forms a kind of arch, under which one may walk without being wetted; and the neighbouring people seem formerly to have made this a diversion, there being several niches and seats cut in the rock, and likewise some grottoes, which are now become inaccessible. Seneca relates a practice of the inhabitants near the cataracts of the Nile, which appears quite incredible, viz. That two of them used to get into a small boat, the one to guide it, the other to throw out the water, and, directing the little vessel with their hands, they dexterously steered through the narrow channels without touching the rocks, till at last they were hurried down the precipice by the falling river. The frighted spectators then supposed them inevitably swallowed up and lost, but presently saw them appear

again upon the water at a great distance.—Some modern travellers seem to confirm this account; but Dr. Pococke, who saw several of the cataracts, takes no notice of any such practice; nor does he represent them as such frightful falls as they are generally supposed to be. The doctor tell us of some rocks that lie across the river in three different places, dividing the stream, and causing several falls of water; but he makes the greatest of them not above seven or eight feet, and others about four or five. He acknowledges however, that the natives talked of other cataracts besides those he saw, and even reckoned seven of them, which seems to agree with the accounts of the ancients: but, as to the Catadupa, those high cataracts whose noise made the neighbouring inhahitants deaf, he looks upon the whole as fabulous.

THE PYRAMIDS OF EGYPT.

THESE famous pyramids, the wonderous monuments of the wealth and grandeur of the ancient kings of Egypt, are on all hands allowed to have been built at least twelve hundred years before the birth of our Saviour. The three pyramids that are most taken notice of by travellers, as exceeding all the rest both in bulk and beauty, are situated on a ridge of rocky hills on the borders of the Lybian desert, about ten miles westward from the village of Gize or Geeza, which is almost opposite to the city of Cairo, and is supposed to be the spot where the ancient Memphis stood, though there are now not the least traces to be found of the ruins of that renowned city. The hill, on which they stand, rises with an easy ascent from the plains of Egypt, to the height of a hundred feet or upwards; and the rock consists of such freestone as is used in the pyramids themselves.

The largest of these pyramids, which has suffered least by time and weather, is six hundred and ninety-three English feet square at the basis, and its perpen-

dicular height is four hundred and ninety-nine feet; but, if we take the height as the pyramid ascends inclining, it is then six hundred and ninety-three feet, which is exactly equal to the breadth of the basis, so that the angles and basis make an equilateral triangle. The whole area therefore of the base contains four hundred and eighty two thousand two hundred and forty-nine square feet, which is something more than eleven acres of ground.

On the outside of this pyramid there is an ascent by steps, which at the bottom are four feet in height and three in breadth, but the higher we go they gradually diminish; being so contrived, that a line stretched from any part of the basis to the top would touch the edge of every step, if the stones were not impaired by the air and rain; but at present they are so washed and mouldered away, that they cannot conveniently be ascended, except on the south side, or at the north-east angle. The breadth and depth of every step is one entire stone, several of them thirty feet in length; and the number of steps, according to Mr. Greaves, is two hundred and seven, but travellers differ in their computations. Whether these steps were intended to facilitate the ascent to the top, or were designed to be filled with prismatical stones, so as to make each side of the pyramid smooth and upon a plane, we shall not determine, but Dr. Shaw gives some cogent reasons for the latter opinion.

The top of this pyramid does not end in a point, as it appears to those who view it from below, but in a little square, consisting of nine stones, besides two that are wanting at the angles. Each side of the platform is about sixteen feet, so that a considerable number of people may stand upon it, from whence there is one of the most beautiful prospects that can be imagined. It has been reported by many travellers, that a man standing on the top cannot shoot an arrow beyond the bottom of the pyramid, but that it will fall on some part of the structure; whereas it is certain that a strong arm and a good bow will send an arrow to a much greater distance. As to the story of these pyramids

casting no shadows, it is contrary both to reason and experience; for, though at noon they cast no shadow in the summer, and for almost three parts of the year, yet in winter at noon, and in the morning and evening all the year round, they certainly cast a shadow proportionable to their bigness: and it is observable, that Thales took the height of these pyramids by their shadows above two thousand years ago, as we learn from Pliny and Laertius.

On the north side of the large pyramid, sixteen steps from the bottom, there is a square narrow passage, leading downwards into the body of the structure. This entrance is about three feet high, and as many wide, and its length ninety-two feet and a half. Those who have been curious enough to creep through this narrow passage inform us, that at the end of it there is a wider place, about ninety feet long, and of unequal breadth, supposed to have been dug for the discovery of some hidden treasure, but not remarkable for any thing except the large bats by which it is inhabited. On the left hand there is another passage, five feet high, and a hundred and ten in length, through which is an ascent to two galleries, one of them running off horizontally, and the other rising upwards in the same direction with the passage. The horizontal gallery leads to an arched vault or chamber, about seventeen feet long, and fifteen broad, which smells like a grave, and is half full of rubbish. The walls are entire, and plastered over with lime; and the roof consists of large smooth stones laid sloping, so as to meet at top in an angle. Near the entrance into this gallery there is a circular well, three feet in diameter, which is lined with white marble, and little holes are left in the sides, opposite to one another, wherein a person that descends into it must fix his hands and feet; which sort of contrivance is seen in many of the wells and cisterns of Egypt.—The ascending gallery, whether we regard the materials or workmanship, is not inferior to the most magnificent buildings. It is paved and lined with white polished marble, cut in vast squares, and so curiously put together, that the joints are scarce discernible.

The height of this gallery is twenty-six feet, its breadth six, and on each side of it there are benches of polished stone.

From hence opens a square hole into some little chambers or closets lined with marble, and then into a noble hall situated in the centre of the pyramid, being equally distant from all the sides, but rather nearer the basis than the top. The floor, sides, and roof of this room are all of Thebaic marble; and the stones are of a prodigious size, especially those that form the roof, lying across from one side to the other, like so many huge beams, and supporting an enormous weight. As to its dimensions, its length is thirty-four feet, its breadth seventeen, and its height near twenty.

In this stately hall stands a tomb, placed exactly north and south, and equally distant from all sides of the room except the east, from whence it is as far again as from the west. It consists of one piece of marble hollowed, without any lid or covering, and on being struck it sounds like a bell. The general opinion is, that it was designed for the tomb of Cheops or Chemnis, king of Egypt, the supposed founder of this pyramid. There is no appearance however of any corpse having ever been laid in it, and probably there never was; for Diodorus, who wrote about sixteen hundred years ago, informs us, that Chemnis, and Cephren, the founder of the next pyramid, notwithstanding they intended these structures for their sepulchres, were not buried in them, the people being so exasperated by the hardships they had undergone in the erecting them, and by their repeated cruelties and oppressions, that they threatened to tear their dead bodies in pieces; upon which they commanded their friends to bury them in some obscure place in a private manner.

This tomb is of the same marble with which the whole room is lined, viz. a sort that is so streaked and variegated with black, red, and white spots, which some call Thebaic, but others suppose to be a kind of porphyry. Its figure is like an altar, and the marble smooth and plain, without any sculpture or other or-

nament. If we measure its outward superficies, it is seven feet three inches and a half in length, three feet and almost four inches in depth, and much the same in breadth; but the cavity within is little more than six feet long, two feet deep, and as many broad. From these dimensions, as well as from the embalmed bodies in Egypt, it has been justly observed by Mr. Greaves and others, that there is no decay in nature, but that the men of this age are of the same stature they were three thousand years ago. How this tomb was brought into the place where it now stands is difficult to conceive, it being impossible it should come through the narrow passages above described; which makes it generally supposed to have been raised up thither from without, before the room was finished, and the roof closed up: but perhaps there is some other way to the room within the structure, which has not yet been discovered.— We have nothing to add concerning this tomb, but that there is a hole dug underneath it, and a large stone in the pavement near it removed, which was probably done in hopes of finding some treasure; the burying of money in sepulchres being not only a practice of the ancients, but continues to this day in some parts of the East-Indies.

Travellers take notice of a remarkable echo, or rather of a long continued sound, which is heard on discharging a musket at the entrance into the first pyramid. This is mentioned by Plutarch; but, surprising as it is, the effect may be accounted for, as Mr. Greaves observes, by considering, that the sound being shut in, and carried along those smooth narrow passages already described, to the middle of the pyramid, finding no way out, reflects upon itself, causing a circulation of the air and a confused noise, which gradually lessens and dies away as the motion ceases.

To the southward of the first pyramid, at a very little distance, stands the second, supposed to have been built by Cephren the brother of Cheops, and designed for a sepulchre, as well as the former. The stones of this pyramid are white, but much less than those of the first; nor do the sides rise by degrees or

steps, like the other, but are smooth and even; and the whole structure, except on the south, seems not to have received any considerable damage. The dimensions of it, both as to height and breadth, are much the same as those of the pyramid already described, but its ascent is somewhat steeper. At some distance from the basis, on the north side of this pyramid, there is a hole, which probably was made in order to find a passage to the inside of it; but none has been yet discovered, nor is it known whether there are any rooms or apartments within, though it is reasonable to suppose there are, as well as in the former. On the north and west sides of this pyramid there is a fosse or trench, about ninety feet in breadth and thirty in depth, along which are a great number of cells or apartments hewn out of the solid rock, designed (as is supposed) for lodgings for the Egyptian priests. They are entered through such square openings as that described in the first pyramid, and many of the chambers have a communication with others behind them, which are now filled with rubbish.

About a furlong from the second pyramid stands the third, upon such an eminence or rising of the rock, that it appears equal to the former at a distance, though it is much less both in height and breadth. Some ancient writers affirm, that this pyramid was built, or at least cased, with black Ethiopic marble; but, whatever it may have been formerly, at present the whole structure seems to be of a clear whitish stone, somewhat better and brighter than either of the former pyramids. Each side of its base is about three hundred feet, and its height is much the same; and all round it are to be seen the remains of the granite with which it was adorned, the greatest part whereof has been carried away, though some few pieces continue in their places. Mycerinus, the son of Cheops, is said to have been the founder of this pyramid, and Diodorus says his name was engraved on the north side of it, but nothing of that kind is to be seen at present.

At about the distance of ten miles from these pyra-

mids, are those of Socotra, so called from a mean village of that name. These pyramids, which extend from north to south, are seated at the foot of the mountains, in a plain that appears formed by nature for the use to which it is applied, it being of no great extent, but so high, that it is never overflowed by the Nile. One of these pyramids rises above the rest, and is called the great pyramid to the north. Mr. Norden, on measuring it, found that its east side extended six hundred and ninety feet, and the north side seven hundred and ten. Its perpendicular height is three hundred and forty-five feet. It has a hundred and fifty-six steps, each from two to three feet in height; and is built of the same kind of free-stone as the others, but was cased with a fine hard stone, which is still remaining in several parts of the structure, though a great deal has fallen down. About one third of the way up, is an entrance three feet five inches wide, and four feet two inches high. The stones within, are of the height and breadth of the entrance, and about five feet in length. Our author and his companions entered this passage, which is steep, and has also holes cut as rests for the feet. Having passed through it, they entered a room twenty-two feet and a half long, and eleven feet ten inches wide. At the height of ten feet six inches, a range of stones projects five inches inwards on each side; and in the same manner twelve tiers project one farther than the other, till they meet at the top. To the west of this room is another that resembles it; and they are both formed of smooth white stones, so large, that there are only seven of them in length, and three or four in breadth.

Another pyramid, at the distance of a mile to the south-east, is termed the great pyramid to the south, and is about six hundred feet square at the bottom. It is built within of good hewn stone, and appears to have been originally cased all the way up.

About two miles to the east of the last great pyramid is one on a lower ground, built of unburned brick, that seems to have been made of the mud of the Nile,

it being a sandy, black clay, with some pebbles and shells in it, mixed up with chopped straw, in order to bind the clay together, as unburned bricks are usually made at present in Egypt, and other parts of the East. Some of these bricks are thirteen inches and a half long, six inches and a half broad, and four inches thick; but others are fifteen inches long, seven broad, and four inches three quarters in thickness; but were not laid so as to bind each other. This pyramid is much crumbled, and very ruinous. It extends two hundred and ten feet on the west side, and is a hundred and fifty feet high; and the top is forty-three feet by thirty-five. It seems to have been built with five degrees, each being ten feet broad, and thirty deep; yet the ascent is pretty easy, on account of the bricks having crumbled away.

Notwithstanding what we have said of Cheops, Cephren, and Mycerinus, it is a subject of much dispute, who were the builders of these wonderful structures. Some pretend they were erected by the patriarch Joseph for granaries, to lay up the corn of the seven plentiful years against the ensuing famine; but, most of them being solid piles of stones, with very few cavities within them, and their figure the most improper of any for that purpose, the conjecture at first sight appears groundless and absurd. Others suppose them to have been erected by the Israelites, during their heavy bondage in Egypt under the tyranny of the Pharoahs; and this opinion is supported by the authority of Josephus, who says they were employed in cutting canals, building walls, throwing up banks, and, amongst other oppressions, in raising the vast pyramids in question. We may add to this, that no time seems more likely for the Egyptian kings to undertake such amazing structures, than when they had so many hundred thousand slaves in their dominions, whom it was deemed prudent to keep in action, to divert them from mutiny and rebellion.

After all, it must be confessed, that there is little agreement either among the natives of Egypt, or ancient historians, with respect to the founders of these

pyramids; and, as this is a matter of uncertainty, it would be in vain to endeavour to determine the time when they were erected. However, if we do not allow them to be so ancient as the time of the Israelites being in Egypt, (which yet does not appear improbable) we must grant them to be above three thousand years old; for Herodotus, who lived above two thousand two hundred years ago, could find little satisfaction in his enquiries concerning them; and Diodorus, who lived before the birth of Christ, supposes the great pyramid to have been built at least a thousand years before his time.

Another thing disputed is the purpose for which these pyramids were built; though the generality of writers on this subject are of opinion that they were intended for sepulchral monuments. Diodorus confirms this hypothesis, and Strabo supposes all those near Memphis to be royal sepulchres. And yet some think it not improbable, from the sumptuous apartments, galleries, benches, &c. that they were designed for other uses than mere sepulchral monuments, which are commonly plain arched vaults; perhaps for temples, as Dr. Shaw imagines; for, as the whole Egyptian theology was couched in mysterious emblems and figures, no places could be better contrived for the adyta, which had so great a share in their mysteries. Besides, those chests which have been supposed to have been the coffins wherein the bodies were deposited, chiefly because they are about six feet long, the length of a man, may rather have been designed to enclose some of the priestly vestments, or sacred utensils, or some of their idols, &c. especially considering they are of an oblong square figure, and not narrower at one end, which was the common form of coffins; and then the depth and breadth of these, which is about three feet, are out of all proportion, as Dr. Shaw observes. However, there is another reason to think these huge structures were designed for sepulchres, arising from the theology of the Egyptians, who not only believed the resurrection, but that, as long as the body endured, the soul continued with it.

Hence it was that they took so much care to embalm their dead, in order to preserve them from corruption, that so the souls of the deceased might long remain about their respective bodies, not to animate or quicken them, but only as attendants or guardians, unwilling to leave their former habitations: and upon the same account they deposited them in the most durable buildings, endeavouring thereby, as far as they were able, to render them eternal.

The reason why the Egyptians built these monuments, in a pyramidal figure, seems to have been, according to Mr. Greaves, because this is the most permanent form of structure, being neither overpressed by its own weight, nor so subject to the sinking in of rain as other buildings. Add to this, that they might thereby intend to represent their deities, it being customary among the heathens to express the objects of their worship either by columns fashioned like cones, or by quadrilateral obelisks, which are a lesser sort of pyramids, and of which several are still standing entire in different parts of Egypt.

How these wonderful structures were built, and by what means the stones, especially those vast ones of the first pyramid, were raised to such a height, has likewise been matter of much speculation. Herodotus, whose expressions are a little obscure, supposes that, when they had laid the first range, they raised others hither from the ground, which formed the second row; and, by an engine placed upon that, they drew up the stones that composed the third; there being as many engines as layers of stone, or else one that might be occasionally removed. Mr. Greaves imagines, that they first built a large tower, the height of the intended pyramid, to the sides whereof they applied the rest of the structure, piece after piece, like so many buttresses, which lessened in height till they came to the lowest degree. Some have conjectured, that they took the advantage of building round a hill; if so, these pyramids were built with much less labour and expence than is generally imagined. In short, in a matter of such uncertainty, every one must

be left to his own conjectures; but, as to those already mentioned, they appear liable to various objections; nor does there seem any reason for endeavouring to lessen the difficulty of erecting these prodigious structures, since the wealth of the Egyptian monarchs, and the number of hands employed, were undoubtedly equal to the undertaking, though confessedly great and wonderful.—Diodorus tells us, that the number of men employed in building the first or greatest pyramid was 360,000, large bodies of them relieving one another at stated periods, and alternately taking their turns of rest and labour. It is agreed that twenty years were spent from the beginning to the finishing of the work; and Herodotus adds, that in his time there was an inscription on the pyramid, declaring how much had been expended only in radishes, onions, and garlic for the workmen, being no less than sixteen hundred talents of silver, or about 400,000l. sterling; from whence we may judge to what vast sums the whole expence must have amounted.

At a small distance from the second pyramid stands a monstrous figure, usually called a Sphinx, which the ancients represented as having the head and breasts of a woman, the wings of a bird, the claws of a lion, and the body of a dog. This figure the Egyptians used in their hieroglyphics to represent a harlot, intimating the danger of being captivated with the beauty of a faithless woman, whom the fond lover in the end, finds as cruel and rapacious as a lion. Of this sphinx, however, there is little more to be discerned at present than from the shoulders upwards, being a huge bust of a woman, all cut out of the solid rock, except the upper part of the head, which seems to have been a separate stone. Its height is almost thirty feet, and the breadth is much the same at the lower part of the neck, or beginning of the breast. It is fifteen feet from the ear to the chin, and we may suppose the other parts of the figure are proportionable; but the sand is so accumulated round it, that one can but just discover the top of the back, wherein

there is a hole about five feet long, seventy-five feet (according to Dr. Pococke) from the hinder part of the neck, and thirty from the tail. Besides this hole in the back, there is another on the top of the head, into which a full grown person may descend, and from whence it is supposed the artful priests used to deliver their oracles. Some travellers have also imagined, that there is a subterraneous communication from the sphinx to the largest pyramid; but this seems to be mere conjecture. This rock is dug away all round the sphinx to a considerable distance, which was undoubtedly employed in building the pyramids. Pliny makes mention of this sphinx, and tells us it was thought to be the sepulchre of king Amasis.

THE CATACOMBS OR MUMMY PITS.

In the plain in which the last pyramids are placed, are the famous catacombs or mummy-pits, of which travellers give us the following description. Those who have the curiosity to visit these pits, where the mummies or embalmed bodies are deposited, are let down by ropes, into a kind of wells about four feet square, cut through a slaty rock, covered with sand, which, being moved by the wind, sometimes fills up these entrances. Some of the pits are twenty or twenty-five, and others thirty feet deep; but several of them are cased, as far as the depth of the sand, with large unburned bricks. At the bottom there are horizontal passages, which lead into square rooms, where are found the remains of embalmed bodies, swathes scattered up and down, and sometimes chests and coffins standing upright and entire, which are made of sycamore or Pharaoh's fig-tree, and have continued sound in these subterraneous apartments above three thousand years, notwithstanding the wood is spongy and porous to outward appearance. The top of the coffin is commonly shaped like a head, with a face painted upon it resembling a woman; the rest is one continued trunk, and the bottom is broad and flat, upon which it stands

upright in the repository. Most of these coffins are adorned with hieroglyphics, and some of them are finely gilt and painted, either with the figure of some tutelar deity, or that of the deceased. Little images of various kinds, some of copper, others of stone, are generally ranged round the pedestals of the coffins, as if designed for so many guardian genii and attendants. The bodies, upon opening the coffins, appear wrapped up in a linen shroud, upon which are fastened several scrolls, painted with hieroglyphic characters. These scrolls commonly run down the belly and sides, or else are fixed on the knees and legs. On a kind of head-piece of linen, which covers the face, the countenance of the person is represented in gold, and the feet have also a covering of the same, shaped like a slipper, and painted with hieroglyphics. The whole body is swathed with fillets, or narrow bandages of linen, which are wrapped round in such a curious manner, with so many windings, and so often one upon another, that it is supposed a corpse has seldom less than a thousand ells of filleting. Those especially about the head and face are laid on with wonderful neatness, insomuch that the shape of the eyes, nose, and mouth, are plainly perceived. The breast is also covered with folds of linen richly gilt and painted; and sometimes we see the figure of a woman with her arms extended, the wings of fowls, or other ornaments.

It is to be observed, that the mummy-chests or coffins are not always of wood, some few being of stone; and, of the wooden ones, some are made of boards, and others hollowed out of one piece of timber. There are also some bodies that have no other coffins than pieces of linen gummed or glued together, which yet are as durable as those of wood or stone; and there are others which have no coffins at all, but are wrapped up in reeds or branches of palm. These last, we may imagine, were the poorer sort of people, whose families could not bear the expence of coffins; and it is probable they were piled one upon another, whereas the coffins stood upright upon their pedestals.

THE RATTLE-SNAKE.

The rattle-snake is found commonly in most of the warm parts of America; and we shall be the more particular on this subject, as it has afforded matter of speculation and wonder to the most curious inspectors into the works of nature. This creature derives its name from certain joints at the end of its tail, which fold over each other somewhat like the tail of a lobster; and on being shook, make a rattling noise. The number of these joints or rattles is uncertain, being more or less according to the age of the snake, as some authors assert, imagining that every year there is the addition of a new rattle. However, they seldom exceed twenty, though Mr. Dudley was told by a man of credit, that he killed a rattle-snake, which had between seventy and eighty rattles, with a sprinkling of grey hairs, like bristles, all over his body; and that it was full five feet six inches long, and as big as the calf of a man's leg. Dr. Derham and others have observed, that Providence has wisely given these rattles to this poisonous serpent, that the noise might be a warning to man and beast to avoid the approaching danger.

The usual length of the rattle-snake is from three to five feet. Dr. Tyson dissected one four feet five inches long, whose greatest circumference was six inches and a half, that of the neck three inches, and near the rattle two inches. The top of the head was flat as in the viper, and by the protuberance of the jaws it somewhat resembled the head of a bearded arrow. At the extremity of it were the nostrils; and between them and the eyes, but a little lower, were two other orifices, which the doctor took for ears; but he afterwards found they only led into a bone that had a pretty large cavity, but no perforation. The eye was round, and about a quarter of an inch in diameter, over which there was a large scale jetting out, which seemed to serve it for an eye-lid. The scales on the head were the smallest of any, those on the back the

largest, increasing in proportion to the thickest part of the body, and thence diminishing again to the junction of the rattle, all of them in figure somewhat resembling the seed of a parsnip. They were of various colours, those on the head being like the feathers on the back of a green-finch, speckled with black spots, four of which were larger and very remarkable. Those on the back were a dark fillemot and speckled, forming by this mixture a curious chequer-work; but as they approached the end of the tail they became darker, and at last almost black. The scales on the back had an edged rising in the middle, which was still less protuberant nearer the sides, where they were flat. The belly was covered with long scales of a yellowish colour, and speckled with black; but beyond the anus there were some scales of a lead colour, and from them to the rattle were six rows of smaller scales of the same colour. The scales of the belly were joined together by distinct muscles, the lower tendon of each muscle being inserted into the upper edge of the following scale, and the other tendon of the same muscle inserted about the middle of the preceding scale. To each scale a rib was appropriated, whose point was joined with the extremity of it, which must considerably promote the use for which nature designed them, assisting them to perform their reptile motions; for the scales are indeed so many feet, which, being free and open below, do thereby take hold of the ground. They move quicker on the rocks than on the earth or plains, because there they have firmer footing; but in soft ground, though their belly be flat, they can alter its figure so as to take the deeper hold, as is observed in a viper. In short, this coat of armour is so curiously contrived, that, though it covers the whole body, yet by its frequent jointings it admits the animal to make various motions.

Upon examining the lungs of the rattle-snake, which consist only of one lobe, the fore part whereof is full of numerous vesicles, and the latter an entire large bladder, our author takes occasion to observe, that, in animals where respiration is not so frequent, nature

provides a sufficient store-house for the air in such large bladders, whence it is dispensed as the animal œconomy requires it; for tortoises, vipers, rattle-snakes, toads, &c. which sleep a great part of the year, as previously to this repose they take in their store of food, so perhaps of air too; for, whilst they remain thus asleep, and sometimes dead to all appearance, it may be questioned whether they have any motion of those parts which are requisite to draw in fresh air in inspiration. And this seems to be confirmed by the instance of a viper, which remained alive some days after the skin and most of the viscera were separated, and the lungs were not observed all that time to rise or fall, as in inspiration and expiration, but appeared equally extended with air; only as soon as it died the lungs fell. The stomach of this viper was empty, and so was that of the rattle-snake the doctor dissected, which for four months at least had eaten nothing; so that, though they can live a long time without food, air being necessary for their subsistence, they are provided with the receptacles above-mentioned.

The head of this snake is small, but the mouth is very large, and its tongue in all respects like that of a viper, and composed of two long round bodies, joined together from the root two-thirds of its length. These are darted out and retracted again with great agility. To facilitate its exertion, the under jaw is divided for a considerable space; for if it were conjoined, as in other animals, and beset with teeth, they would be apt to injure the tongue, or at least it might prove incommodious to the use it is designed for, which is supposed to be the catching of flies, and other small animals it has a mind to devour. Over the tongue lies the larynx, not formed with that variety of cartilages usual in other creatures, but having a sort of slit for receiving and discharging the air, which, passing only through such a slit, without other organs to modulate it, causes the hissing sound emitted by the rattle-snake and other serpents.

The teeth are of two sorts; first, the lesser, which

are seated in each jaw, and serve the rattle-snakes for the catching and retaining their food; secondly, the poisonous fangs which kill their prey: and, as they neither chew nor bruise their food, but swallow it whole, they have no occasion for grinders. Of the first sort of teeth there are, in the lower jaw, two rows on each side, and five in a row, the inward lesser than the outward, and in all twenty: in the upper jaw are only sixteen, five on each side placed backwards, and six before; and none of those are poisonous. The fatal fangs are placed without the upper jaw, towards the fore-part of the mouth, not fastened to the jaw-bones, as the other teeth, but to muscles or tendons, except the two outermost and largest, which are fixed to a bone that may be taken for the ear-bone. These fangs are not to be perceived on first opening the mouth, for they lie flat under a strong membrane, or sheath, but are to be erected upon occasion. They are hooked, and in all of them, especially the larger, there is a hole towards the root, and towards the point a very plain slit, from whence to the root they are perfectly hollow, as the doctor discovered by gently pressing the side of the gum with his finger; for then the poison rose through the hollow of the teeth, and issued out at the slit. This poisonous liquor is of a water-colour, slightly tinged with yellow.

THE LAND CRAB.

The land-crabs are found in Barbadoes, and most of the neighbouring islands in the West Indies.

The land-crab has a smooth entire thorax, and the two last joints of its feet armed with spines. They are of various sizes, the largest about six inches wide: they walk sideways like the sea-crab, and are shaped like them, but they differ considerably in colour; some being black, some yellow, some red, and others variegated with red, white, and yellow mixed. Some of these are poisonous, and several people have died by

eating them, particularly the black kind. The light coloured are reckoned best; and when full of flesh, are very well tasted. In some of the sugar islands they are eaten without danger, and are no small help to the negro slaves, who would frequently fare very hard without them.

These animals live not only in a kind of orderly society in their retreats among the mountains, but regularly once a year march down to the sea-side, in a body of some millions at a time. As they multiply in great numbers, they choose the month of April or May to begin their expedition; and then sally out by thousands from the stumps of hollow trees, from the clefts of rocks, and from the holes which they dig for themselves under the surface of the earth. At that time the whole ground is covered with this band of adventurers, insomuch that a person cannot set down his foot without treading upon them. The sea is their place of destination, and to that they direct their march with the utmost precision. No geometrician could send them to their destined station by a shorter course, for they neither turn to the right nor left, whatever obstacles may intervene; and even if they meet with a house, they will attempt to scale the walls, to keep the unbroken tenor of their way. But, though this be the general order of their route, they, upon other occasions, are obliged to conform to the face of the country; and if it is intersected with rivers, they are then seen to wind along the course of the stream.

The procession sets forward from the mountains with the regularity of an army under an experienced commander. They are commonly divided into three battalions; of which the first consists of the strongest and boldest males, who, like pioneers, march forward to clear the route, and face the greatest dangers. They are often obliged to halt for want of rain, and to go into the most convenient encampment till the weather changes. The main body of the army is composed of females, which never leave the mountains till the rain is set in for some time, and then descend in regular battalia, being formed into columns

of fifty paces broad, and three miles deep, and so close that they almost cover the ground. The rear-guard follows three or four days after; a straggling undisciplined tribe, consisting of males and females, but not so vigorous as the former. The night is their chief time of proceeding; but if it rain by day, they do not fail to profit by the occasion; and they continue to move forward in their slow uniform manner. When the sun shines hot upon the surface of the ground, they make a general halt, and wait till the cool of the evening. When terrified, they march back, in a confused disorderly manner, holding up their nippers, with which they sometimes tear off a piece of the skin, and then leave the weapon where they inflicted the wound. They even try to intimidate their enemies; for they often clatter their nippers together, as if to threaten those who disturb them. But though they thus strive to be formidable to man, they are much more so to each other; for they are possessed of one most unsocial property, which is, that if any of them by accident is maimed, in such a manner as to be incapable of proceeding, the rest fall upon and devour it on the spot, and then pursue their journey.

When, after a fatiguing march, and escaping a thousand dangers, (for they are sometimes three weeks in getting to the shore) they have arrived at their destined port, they prepare to cast their spawn. They have no sooner reached the shore, than they go to the edge of the water, and let the waves wash over their bodies two or three times. This seems only a preparation for bringing the spawn to maturity; for, without farther delay, they withdraw to seek a lodging upon land. In the mean time, the spawn grows larger, is excluded out of the body, and sticks to the barbs under the tail. This bunch is seen as big as a hen's-egg, and exactly resembles the roes of herrings. In this state, they once more seek the shore, and shaking off their spawn into the water, leave accident to bring it to maturity. At this time whole shoals of hungry fish are at the shore, in expectation of this annual supply; the sea to a great distance is black with them; and

about two-thirds of the crab's-eggs are immediately devoured by these rapacious invaders. The eggs that escape are hatched under the sand; and soon after, millions of these little crabs are seen quitting the shore, and slowly travelling up to the mountains. The old ones, however, are not so active to return; they have become so feeble and lean, that they can hardly creep along, and their flesh at this time changes its colour. Most of them, therefore, are obliged to continue in the flat parts of the country till they recover, making holes in the earth, which they cover at the mouth with leaves and dirt, that no air may enter. There they throw off their old shells, which they leave quite whole; the place where they opened on the belly being unseen. At that time they are quite naked, and almost without motion for six days together, when they become so fat as to be delicious food. They have then under their stomachs four large white stones, which gradually decrease in proportion as the shell hardens, and, when they come to perfection, are not to be found. It is at this time that the animals are seen slowly making their way back, which is commonly performed in six weeks.

When possessed of its retreats in the mountains, the land-crab is impregnable; for, only subsisting upon vegetables, it seldom ventures out; and its habitation being in the most inaccessible places, it remains for a great part of the season in perfect security. It is only when impelled by the desire of bringing forth its young, and when compelled to descend into the flat country, that it is taken. At that time the natives wait for their descent in eager expectation, and destroy thousands; but, disregarding their bodies, they only seek for that small spawn which lies on each side of the stomach within the shell, of about the thickness of a man's thumb. They are much more valuable upon their return after they have cast their shells; for being covered with a skin resembling soft parchment, almost every part except the stomach may be eaten. They are taken in the holes, by feeling for them with an instrument, and are sought after by night, when on their

journey, by flambeax. The instant these animals perceive themselves attacked, they throw themselves on their backs, and with their claws pinch most terribly whatever they happen to fasten on. But the dextrous crab-catcher takes them by the hinder legs, in such a manner, that the nippers cannot touch them, and thus he throws them into his bag. Sometimes also they are caught when they take refuge in the bottoms of holes in rocks by the sea-side, by covering the mouth of the hole to prevent their getting out, and then soon after, the tide enters the hole and the animal is found, upon its ebbing, drowned in its retreat.

THE TURTLE, OR TORTOISE.

These animals are found on the coasts of Ascension, Bourbon, and many of the neighbouring African islands. There are two kinds of them, viz. the land and the sea-tortoise; and the latter is of four kinds, that is, the trunk turtle, the loggerhead, the hawksbill, and the green turtle; but it is only one sort, called the hawksbill, which furnishes that beautiful shell so much admired in Europe. Its shell is thick, and consists of two parts, the one covering the back, the other the belly, and the two are joined together at the sides by strong ligaments, which yet allow of a little motion. In the fore part is an aperture for the head and fore legs, and behind for the hind legs and tail. We are told that the under shell alone is used, which is separated from the upper, by making a little fire underneath, and as soon as it is warm it is easily taken off in laminæ, or leaves, with the point of a knife, without killing the animal, which being turned to sea again acquires a new shell. These leaves are thirteen in number, eight of them flat, and five a little bent; and four of the flat ones are sometimes a foot long, and six or seven inches broad. The best tortoise-shell is thick, clear, transparent, and sprinkled with brown and white; but, when used in marquetry,

&c. the workmen give it what colour they please, by laying coloured leaves underneath it. It may be fashioned in what manner the workman pleases, by softening it in warm water, and then putting it into a mould; for then, by the assistance of a strong iron press, it will take any impression, and may afterwards be adorned and embellished at pleasure.

Of the four kinds of turtle, only one of them is proper for food; this is the green turtle, which is generally esteemed, by the greatest part of those who are acquainted with its taste, to be the most delicious of all eatables; and, at the same time, nothing can be more wholesome. The females go on shore to lay their eggs, which they deposit in a large hole in the sand, just above the high water mark, covering them up and leaving them to be hatched by the heat of the sun. A respectable writer informs us, that he has seen, upon opening one of them, at least two hundred eggs, exactly round, taken out of it, about forty of which were enclosed in whitish tough skins, with a substance like jelly round the yolk, and were ready to be laid all at one time; and Mr. Rogers observes, that he saw, on an island in the South Sea, a turtle that had at least eight hundred eggs in its belly, a hundred and fifty of which were skinned, and ready for laying. In about twenty-five days after laying, the eggs are hatched by the heat of the sun; and then the little turtles, being as big as young quails, run directly to the sea, without any guide to lead them or show them the way. When any of these small ones are caught before they get into the sea, they are generally fried whole, and are said to be delicious eating.

Those who watch on shore for the turtles, turn them on their backs, which is not performed without some difficulty, for they are very heavy, and struggle hard. After this, if they are not far enough on shore, they haul them above high-water mark, and leave them till it suits their convenience to take them away; for, when once they are on their backs, they are not able to stir from the place. The writer of commodore Anson's voyage, says, that in the heat of the day, they

often saw great numbers of them fast asleep, floating on the surface of the water; when they usually sent out their boat, with a man in the bow, who was a dexterous diver; and as the boat came within a few yards of the turtle, the diver plunged into the water, taking care to rise close upon it; when, seizing the shell, near the tail, and pressing down the hinder parts, the turtle was thereby awakened, and began to strike with its feet, which motion, supported both it and the diver, till the boat came up and took them in. A turtle of an ordinary size, and of the best sort, will yield at least two hundred pounds of flesh; and the eggs, which are of the size of a hen's egg, but as round as a ball, will keep for a considerable time.

Turtles being amphibious, feed on grass and weeds, as well in the water as on the land; but they usually make their residence and find their aliment at the bottom of the sea. After they have fed sufficiently, they take their progress into the outlets of rivers for fresh water or air, and then return to their former station. In the intermission of their feeding, they frequently float with their heads above the surface of the water, unless they are alarmed by any appearance of danger, in which case they suddenly plunge to the bottom; for the tortoise having the benefit of lungs, she can distend herself by an influx of air, and be brought to an equilibrium with the water, like a frog; and, like other amphibious creatures, she is enabled to swim by the impulse and retraction of her paws, though for the generality she contents herself with creeping.

Shells in general make a very curious part of natural history, on account of their great variety, the uncouth make of some, and the beautiful colours and pretty ornaments of others; but, as Dr. Derham observes, it would be endless to descend to particulars, and therefore he only mentions that of the tortoise. But, besides the beauty of this covering, it is an instance of the excellent provision the wise Creator has made for the good of the animal world, being a stout guard to its body, and affording a safe retreat for its head, legs, and tail, which it draws within the shell upon any

danger. And it is worth remarking, that the shell supplies the place of all bones in the creature, except those of the extreme parts, the head and neck, and the four legs and tail: so that at first it is somewhat surprising to see a complete skeleton consisting of so small a number of bones, and yet those abundantly sufficient for the use of the animal.

There remains another remarkable thing to be mentioned concerning these creatures, which is, that for two or three months in the year they leave their common haunts, where they chiefly feed, and resort to other places to lay their eggs; and it is thought they eat nothing during that season, so that both males and females grow very lean. This however is certain, that the land-tortoise, who is formed much in the same manner as those of the sea, is able to subsist several months without food; for those which are kept in gardens, out of curiosity in England, are observed to bury themselves in the ground at the approach of winter, and there remain, in a kind of sleepy state, till the return of spring invites them to leave their subterraneous retirement; for which, according to Dr. Derham, they are admirably adapted by the structure of their heart and lungs.]

THE COLOSSUS OF RHODES.

The name of colossus is given to any statue of an enormous or gigantic size. The most eminent of this kind was the colossus of Rhodes, which was a brazen statue of Apollo, whose height was seventy cubits, or one hundred and five feet, and every part proportionable, the thumb being so big that few men could grasp it with their arms, and every finger of the size of an ordinary statue. One of its feet stood on one side of the mouth of the harbour, and the other on the opposite side, so that ships under sail passed between its legs. It was the work of Chares, a disciple of Lysippus, who spent twelve years in making it, and, af-

ter it had stood above 1300 years, it was thrown down by an earthquake. When the Saracens made themselves masters of Rhodes, the statue was found upon the ground broken and demolished, and was sold to a Jew, who loaded nine hundred camels with the metal; which therefore, allowing eight hundred weight to each load, (besides the diminution we may suppose it had suffered by rust and theft in a long course of time) amounted to 720,000 pounds weight, or three hundred and sixty tons; a prodigious quantity of brass to be employed in forming one single statue!—Some of the moderns have doubted whether there ever was such a statue at Rhodes as the colossus above described, and indeed the extravagant dimensions ascribed to it would tempt one to doubt the truth of the relation: but, being mentioned by so many writers of reputation, it is more than probable that there was at Rhodes an image of a prodigious size, dedicated to the sun; though the hyperbolical or figurative expressions, used by some writers concerning it, may have given occasion to others to magnify its dimensions considerably beyond the truth.

CHINESE WALL.

One of the most astonishing remains of antiquity now in the world, is that prodigious wall which was built by the Chinese to prevent the frequent incursions of the Tartars. This wall Du Halde informs us, is higher and broader than the common walls of the cities of China, that is, about twenty-five feet in height, and broad enough for six horsemen to ride a-breast upon it; and it is fortified all along with strong square towers at proper distances, to the number of three thousand, which in the time of the Chinese monarchs, before the Tartars subdued the country, used to be guarded by a million of soldiers. The whole length of it, with all its windings, is computed at near fifteen hundred miles, running all along the three northern

provinces of Pekeli, Shansi, and Shensi, and built on some places which seem inaccessible, as well as over rivers, and such marshes and sandy hollows as appear utterly incapable of admitting a foundation for so weighty a structure. It is chiefly built of brick, and so strongly cemented with an extraordinary kind of mortar, that though it has now stood above two thousand years, exposed to all winds and weathers, it is very little decayed, and the terrace on the top seems still as firm as ever. This amazing wall was built by the emperor Chihohamt, according to some authors, or Tsinshiwhang, according to Du Halde, above two hundred years before the birth of our Saviour; and, though of such stupendous length and bulk, and carried on over mountains and valleys, it was completed within the space of five years, if we credit the Chinese tradition.

Le Compe observes, that this wall was one of the greatest and maddest undertakings ever known; for, though it was certainly prudent to guard the avenues, nothing could be more ridiculous than to carry a wall to the top of some precipices, which it was impossible the Tartarian cavalry should ever ascend: "For my part," says he, "I admire how the materials were conveyed thither; this was not done without a vast expence, and the loss of more men than could have perished in the greatest fury of their enemies."

THE SEA COW.

The Sea Cow is found among the amphibious animals of Kamptschatka. It never comes on shore, but constantly lives in the water. It resembles the cow only in its snout, having neither horns, straight ears, nor legs. It is an animal like a seal, only vastly larger, being about twenty-eight feet long, and of such an enormous bulk, that it will sometimes weigh eight thousand pounds. Its skin is black and thick, like the bark of an aged oak; and so extremely hard, that

it can scarcely be cut with an axe. Its head is small in proportion to its body, and its snout white and rough, with white whiskers about nine inches long. Instead of teeth, it has two flat white bones, one above, and the other below. Its eyes are black, and no larger than those of a sheep, which is remarkable in a creature of so monstrous a size, and its ears are only small openings; its neck can scarcely be discovered, but there are some vertebræ, which enable it to turn its head, and to hang it down in feeding like a cow. The body is round like that of a seal; the female has two teats on her breast; the tail is thick, with some resemblance to the fins of a fish. It has two fins under its neck, about twenty-one inches long; these it uses like hands, and not only swims with them, but takes hold of the rocks with such force, that on being dragged thence with hooks, it will leave the skin behind.

In calm weather these animals swim in droves near the mouths of the rivers: they bring forth in harvest, and never have more than one at a time. They are almost continually eating sea weeds, and have their backs and sides above water; upon which flocks of crows settle, to pick off the vermin they find there. They are caught with great iron hooks, somewhat resembling the fluke of a small anchor. A man in a boat, with three or four rowers, coming among the herd, strikes the hook into one of them; and then about thirty men on the shore, who hold one end of the rope that is fastened to the hook, draw the manetoe towards the land, while those in the boat stab and cut the animal till it dies. When one of them struggles to clear himself of the hook, those of the herd that are nearest, come to his assistance; some frequently overset the boat by getting under it, and others strive to remove the hook, by striking it with their tails, which sometimes succeeds. The male and female have such an affection for each other, that when one of them has in vain used every method in its power to give assistance, it follows the body after it is killed to the very shore, where it sometimes remains two or three days. Their flesh when thoroughly

boiled, has a good taste, and resembles that of beef; the fat of the young eats like that of pork, and the lean is said to resemble veal.

THE SEA CAT.

These animals are caught in spring and autumn, and are thus called from the long hairs standing out on both sides of the mouth. But Dampier, who saw them in the south-sea, has termed them sea-bears. The largest weigh about eight thousand weight. Most of the females taken in spring are pregnant; and those that are near the time of parturition are immediately opened, and the young ones killed. They breed on the coast of America, which has been found by the Russians to extend from east to west, almost to Kamptschatka; there they nurse their young three months, and return with them at the end of summer. The females give suck with two teats placed between their hind legs; but they have seldom more than one at a time. The young see when they are whelped, their eyes are as large as those of an ox; and they have thirty-two teeth, besides two tusks on each side, which begin to appear the fourth day after their birth. They are at first of a dark blue; but grey hair begins to appear in four or five days; and in a month's time, their belly is diversified with black and grey. The male is larger and blacker than the female; and they are so different in their form and strength, that they seem different animals: besides the former are fierce, and the latter mild and timid. The male has from eight to fifty females, of whom he is so jealous, that he will allow none to come near them; and though many thousands lie on the shore, every family lives apart; the male with his females, young ones, and those of a year old, that have not attached themselves to any male; so that the family sometimes consists of a hundred and twenty. Those that are old, or have

no mistress, live by themselves; and some lie asleep a whole month, without nourishment.

They attack all that pass by, for on seeing a man approach, some rush upon him, while others lie ready to support them. They will even bite the stones that are thrown at them, and rush with redoubled violence on him that throws them. If the hunters strike out their teeth with stones, or put out their eyes, they will not fly; and indeed they dare not attempt it, for could they save themselves from man, their own brethren would destroy them; for if any one seems to be driven back ever so little, others approach to prevent his running; and if he appears to design it, fall upon him. Sometimes they are seen fighting for a mile together, and then one may pass them without danger. If two fall upon one, others advance to support the weakest; for they will not allow of an unequal combat. While these battles last, those that are swimming in the sea, raise their heads and look at the combatants, and at length come ashore, and increase their number. When only two of them fight, the battle frequently lasts an hour; sometimes they rest, lying by each other, then both rise at once, and renew the engagement.

When fighting, they hold up their heads, and turn aside to escape a blow; for while their strength is equal, they fight only with their fore paws; but one of them no sooner becomes weak, than the other seizing him with his teeth, throws him on the ground, and then the lookers on come to the assistance of the vanquished. Their most bloody battles are when one endeavours to carry off the mistress or young females of another. They also quarrel when one comes too near them.

If a man endeavours to take a young one, the male attacks him, while the female endeavours to escape with it; but if she drops it out of her mouth, the male leaves his enemy, and seizing upon her with his teeth, beats her against the stones, till she lies down as if dead; but she no sooner recovers, than she is said to crawl to his feet, which she licks and washes with a

copious flood of tears, while the male, stalking about, gnashes his teeth, and tosses his head with every mark of disdain and indignation. They swim exceedingly fast, and when they happen to be wounded at sea, they seize the boats of the fishermen with their teeth, and drag them along so swiftly, that they seem to fly rather than swim upon the water; by which means the boat is frequently overset, and the people drowned.

GROTTO OF ANTIPAROS.

No curiosity of the kind is more deserving of attention than a subterraneous grotto in the island of Antiparos, in the Archipelago. It was first discovered by an Italian traveller named Magni, to whom we are indebted for the following account.

"Having been informed," says our author, "that in the island of Antiparos a gigantic statue was to be seen at the mouth of a cavern, it was resolved that we (the French consul and himself) should pay it a visit. Accordingly we landed on the island, and walked about four miles over some beautiful plains and sloping woodlands, till we came to a little hill, on the side of which yawned a cavern, whose terrific gloom almost repressed our curiosity. After a moment's pause, however, we entered; and had not proceeded above twenty paces when we perceived that the supposed statue of a giant was, in reality, nothing more than a sparry concretion, formed by water dripping from the roof of the cave, and gradually hardening into a figure, which the fears of the country people had formed into a monster.

"Incited by this extraordinary appearance, we determined to penetrate farther, in quest of new adventures; and as we proceeded, new wonders presented themselves to our contemplation: the spars, formed into a variety of trees and shrubs, exhibited a kind of petrified grove, some white, some green, and all re-

ceding in due perspective. Our amazement was much increased by considering that these objects were mere productions of nature, who had, in her playful moments, decorated the scene for her own amusement. But we had hitherto seen but a few of the wonders of the place, and were only introduced into the portico of this stupendous temple.

"In one corner of the half illuminated recess, we discovered an opening about three feet wide, which seemed to lead to a place totally dark, and which our guide assured us contained nothing more than a reservoir of water. Upon this we threw down several stones, which rumbled along the descent for some time, and at length seemed to fall into a bed of water. But as we were anxious to gain more satisfactory intelligence, we prevailed on a Levantine mariner to light a flambeau, and explore the narrow aperture. After continuing within it for about a quarter of an hour, he returned, holding some beautiful pieces of white spar in his hand, and informing us, that the place was full of similar incrustations.

"We now ventured to follow him for about fifty paces, cautiously descending by a steep and dangerous path; but on approaching a precipice which led into a sort of amphitheatre, we returned for a ladder, flambeaux, and other things to expedite our descent. We then went down into the most magnificent part of the cavern, and, having lighted a number of candles, were entertained with a most glittering and interesting scene. The roof was hung with beautiful icicles, transparent as glass, yet solid as marble; the sides were regularly formed with spars; the floor consisted of solid marble; and in several places were representations of magnificent columns, thrones, altars, and other objects, as if nature had designed to mock the richest works of art.

"In the midst of this splendid amphitheatre rose a concretion of about fifteen feet high, which bore so striking a resemblance to an altar that we caused mass to be celebrated there. The beautiful columns that shot up round this altar appeared like candlesticks,

and many other natural objects represented the customary ornaments of a church. Our voices, upon speaking or singing, were increased to an astonishing loudness, and the reverberations which followed the firing of a gun were almost deafening.

"Below this spacious grotto there appeared another cavern, into which I descended about fifty paces, by means of a rope, and at length arrived at a small spot of level ground, where the bottom consisted of a soft clay, and easily yielded to my pressure; but here, as in the upper cave, were a variety of beautiful crystalizations, one of which particularly resembled a table. Upon our egress from this stupendous grotto, we perceived a Greek inscription upon a rock at the entrance, but the characters were so obliterated by time, that it was utterly impossible to decypher them."

From this account M. Tournefort varies in many particulars: for whereas Magni mentions only one abrupt descent or precipice from the entrance to the most magnificent part of the grotto, the other gentleman asserts, that there are many dangerous precipices and rugged ways, through which a visitor must sometimes creep on his belly. He likewise informs us, that the Greek inscription, near the entry, contains a number of proper names; and that there is a tradition among the neighbouring peasants, that these are the names of some persons who conspired against Alexander the Great, and afterwards fled for refuge to this sequestered retreat.

The most particular account of this grotto, however, that has hitherto been published, appeared in the British Magazine in the year 1746, which, as it seems to bear strong marks of authenticity, we shall insert for the entertainment of our readers.

"The entrance," says the writer of this article, "lies in the side of a rock, about two miles from the sea-shore; and is a very large arch, formed of rough craggy rocks, overhung with brambles and climbing plants that give it an air of awful gloominess. Our surgeon, myself, and four other persons, attended by six guides with lighted torches, entered this cavern

about eight o'clock in the morning, in the middle of August. We had not proceeded twenty yards when we lost all sight of day-light; but the roof and sides of the alley through which we were passing, glittered like diamonds by the reflection of our torches. At the end of this passage we were presented with ropes to tie about our middles, which when we had done, our guides led us to the brink of a most terrific precipice. The dreadful depth of this place, and the horror of a descent through a miserable darkness, made me look back to the lane of diamonds we had just passed; but the hope of seeing something curious at the end of my journey, tempted me to lower myself down by a rope as the guides directed. After reaching the bottom, and congratulating my friends on our safe descent, I enquired for the grotto; but our guides told us we had a great way to go yet; and they immediately led us forward, under a ridge of rugged rocks, to the brink of another precipice, much deeper and more terrible than the former. Two of the guides now preceded us with torches; and by their light we could discern that this passage was not so perpendicular as the other, but lay in a steep slant, with a very slippery rock for the bottom; vast pieces of rock jutting out on one side in the descent, and forcing the guides sometimes to creep under, sometimes to climb over, and at other times to go quite round them; whilst a series of dark caverns, like so many monstrous wells, yawned on the opposite side, ready, if a man should slip, to swallow him up for ever.

"We stood some time on the edge, to watch the motions of our guides; and were equally amazed and terrified to see them descend before us until they seemed at a most frightful depth. On their calling to us from the bottom, we began to descend after them; but we had not gone thirty feet down when we came to a place where the rock was perfectly perpendicular, and a vast cavern seemed ready to swallow us on one side, while a wall of rugged rock threatened to crush us on the other. At this terrible prospect I was quite disheartened, and declared I would proceed

no further; but as the guides assured us there was no danger, and my companions resolved to see the bottom, I proceeded to a corner where was placed an old ladder, and by this we all descended.

"Having surmounted this difficulty, we found ourselves at the entrance of another passage, which, as we slid down, appeared to be about nine feet high, and seven wide, and to have for its bottom a green glossy marble. The walls and arched roof being as smooth as if wrought by art, and composed of a glittering red and white granite, supported with red porphyry, made a most splendid appearance. When we entered this passage I expected that we should, at the bottom, join the two guides we had first set down; but alas! when we got there we found ourselves at the mouth of another precipice, which we descended by a second ladder not much better than the former. The dread of falling employed all my thoughts during this descent; but I observed, as my companions were coming down after me, that the wall to which the ladder was fastened, was a solid mass of red marble, covered with white sprigs of rock crystal, and making, with the glow of the purple from behind, one immense sheet of amethysts.

"After sliding about twenty feet through another shallow vault of green and white marble, and refreshing ourselves with a little rum, we proceeded through a slanting passage of rough coarse stone, full of figures of snakes rolled round, and seemingly alive; but in reality as cold and hard as the rest of the stone. When we had walked about two hundred yards down this descent, we saw two beautiful pillars, of a glittering yellow marble, which seemed formed to support the roof; and soon afterwards we descended another precipice, which the guides assured us was the last.

"At the bottom of this precipice, we found ourselves, for some way, upon plain even ground; but after walking about forty yards, we entered an alley, the sides and roof of which were entirely composed of black stone, and the rocks were in some places so steep and rugged, that we were forced to slide down

on our backs, and were bruised miserably in passing. Over our heads were nothing but dismal rocks, some of which threatened to fall in upon us, and the light of our guides' torches only served to show the surfaces of some dirty lakes of water.

"If I had repented of my expedition before, I now gave myself over for lost; bitterly accusing all the travellers who had given such a description of the place as excited people's curiosity, without warning them of the horrors that lay in the way. In the midst of these sad reflections we lost four of our guides, and as the place was now much darker for want of their torches, I expected to follow them into some of those lakes where I supposed they had inevitably perished, although the two remaining guides assured us that we should soon meet their companions again, and that we were very near the end of our journey.

"Our passage was now become extremely narrow, and we were obliged to crawl on our hands and knees over the rugged rocks, when, in an instant, I heard a hissing noise, and found myself in total darkness. The guides told us they had accidentally dropped their torches in a puddle of water, but exhorted us to crawl forward, and told us there was no danger. I was, indeed, astonished at the courage of these men in a place where I thought four of them had already perished; but as I thought it impossible for any of us to escape from our present situation, I determined to lie down and die where I was. One of the guides, however, immediately came up to me, and, clapping his hand firmly over my eyes, dragged me a few paces forward. Whilst I was in this strange situation, expecting death in a thousand shapes, and trembling at the rough behaviour of my conductor, he suddenly lifted me over a great stone, set me on my feet, and removed his hand from my eyes. But what language can express my transport and astonishment at that moment, when instead of darkness and despair, all was splendor and magnificence before me? My friends all appeared about me; the place was illuminated by fifty torches: and all the guides welcomed me into the

Grotto of Antiparos. I now found that the four men whom I had deemed lost, had given us the slip, in order to get the torches lighted before we came; and the other two had wilfully put out their lights, that we might enter out of utter darkness into this pavilion of splendor and glory.

"The grotto in which we now were, is a hundred and twenty yards wide, a hundred and thirteen long, and about sixty yards high. These dimensions are somewhat different from those which travellers have generally presented to the public; but they are certainly accurate, for I took them with my own hand. Imagine, then, an immense arch like this, lined with crystallized white marble, and illuminated by fifty torches, and you will have some idea of the place in which I spent three hours.

"The roof, which is a fine vaulted arch, is hung all over with icicles of white marble, some of them ten feet long, and as thick as a man's waist; and from these depend a thousand festoons of leaves and flowers of the same substance, but so extremely glittering, that it is impossible to look upon them without dazzling one's eyes. The sides of the arch seem planted with trees of white marble, rising in rows above each other; from these are hung beautiful festoons, tied as it were, from one to another, in prodigious quantities; and in some places there actually seem to be rivers of marble, winding in a thousand elegant meanders. All these things have been made, in a long course of years, by the dropping of water, but they really look like trees and brooks transformed to marble.

"The floor was rough and uneven, with red, blue, green, and yellow crystals growing out of it in an irregular manner: these were all shaped like pieces of salt-petre, but so hard that they cut our shoes; and among them are placed icicles, or small pillars of white shining marble, to each of which our guides fastened two or three torches. All round the sides of the arch are white masses of marble in the shape of oak trees, and sufficiently large, in many places, to inclose a piece of ground big enough for a bedchamber. One

of these chambers has a beautiful curtain, whiter than sattin, of the same marble, stretching entirely over the front, on which we all cut our names and the date of our visit, as many other persons had done before us."

THE EVERLASTING FIRE.

In the neighbourhood of Baku, on the Caspian sea, is a phenomenon of a very extraordinary nature, called the "everlasting fire," to which a sect of Indians and Persians, called Gaurs, pay religious worship.

It is situated about ten miles from the city of Baku, in the province of Shirvan, on a dry rocky spot of ground. Here are several ancient temples built with stone, and supposed to have been all dedicated to fire; and among the others there is a little temple in which the Indians now worship. Near the altar is a large hollow cane, from the end of which issues a blue flame, in colour and gentleness resembling a lamp, but seemingly more pure. The Indians affirm that this flame has continued ever since the flood; and they believe that if it were resisted or suppressed in that place, it would break out, and rise in some other.

At a short distance from this temple, is a low cliff of a rock, in which there is a horizontal gap, two feet from the ground, near six feet long, and about three feet broad, out of which issues a constant flame of the colour and nature already described. When the wind blows, it sometimes rises to the height of eight feet, but is much lower in calm weather.

The earth round this place, for more than two miles, has this extraordinary property, that by taking up two or three inches of the surface, and applying a live coal to it, the part so uncovered immediately takes fire, almost before the coal touches the earth. The flame makes the soil hot, but does not consume it, nor affect what is near it with any degree of heat. It is said that eight horses were once consumed by this fire,

being under a roof where the surface of the ground had been turned up, and by some accident had taken flame.

If a cane, or tube of paper, be set about two inches in the ground, closed with earth below, and the top of it touched with a live coal, a flame will immediately issue out without consuming the tube, provided the edges be covered with clay. Three or four of these lighted canes will boil water in a pot, and are sometimes used to cook victuals. The flame may be extinguished in the same manner as that of spirits of wine. It smells sulphureous, like naptha, but is not very offensive.

THE COCHINEAL INSECT.

Amongst the most curious animals of North America may be reckoned the little insect which affords that valuable drug called cochineal, of great use in dying crimsons and scarlets, and esteemed in medicine as a cardiac and alexipharmic. Naturalists have been strangely divided with respect to the origin of cochineal, some referring it to the vegetable, and others to the animal kingdom; to which last it is now proved to belong by incontestable evidence.

These insects, so highly valued in every part of the world for the incomparable beauty of their colour, are of two sexes, but exceedingly dissimilar in their appearance. The female is ill shaped, tardy, and stupid; its eyes, mouth, and antennæ are fixed so deep, and are so concealed in the folds of the skin, that it is impossible to distinguish them without a microscope. The male is very scarce, and is sufficient for upwards of three hundred females: it is active, small, and slender in comparison with the female, and its neck is much narrower than the rest of its body. Its throat is of an eliptic form, a little longer than the head and neck put together, and flattened below; its antennæ are jointed, and from each joint issue long slender hairs,

that are disposed in pairs on each side. It has six feet, each formed of distinct parts. From the posterior extremity of its body two large hairs or bristles are extended, which are about four or five times the length of the insect.

To the upper part of the thorax are affixed two wings of an oblong form, which fall, like the wings of common flies, when the insect walks or rests: they are strengthened by two oblong muscles, one of which extends itself on the outside all round the wing; and the other, which is internal and parallel to the former, seems interrupted toward the summit of the wings.

When these little animals can bear the open air, which is early in the spring, they soon grow large enough to produce young ones; at which time they put twelve or fourteen together into a little nest, made of fine soft hay, straw, moss of trees, or the down that immediately encompasses the cocoa-nut. These nests are placed upon the nopal, or prickly Indian fig-tree, which is carefully cultivated for this purpose; and in three or four days a great many young ones are produced, after which the old ones die. The young ones, coming out of their nests, climb up the nopal, fix themselves to it, and suck its juice, which is their only nourishment, for they do not eat the plant; and therefore they seek out those parts of it that are greenest and fullest of juice, taking care to place themselves so as to be screened from the wind and weather. During this time, whilst they are growing up and become pregnant, great care is taken that no vermin incommode them, and also to keep them clean, and disengage them from certain threads like cobwebs, that grow upon the nopal. They are likewise to be sheltered from too much heat or cold, and from the rain and wind, for the finest of these insects are very tender. The wild sort indeed bear all these inconveniences; but then they are gritty, of an ill smell, and of little value.

With respect to the gathering of cochineal, they first take the females, which die in the nests, after having brought forth their young; and three or four

months after this, as the season permits, when the first young ones are become large enough to bring forth, and have produced some few, the Indians carefully gather them off the nopal with a small brush like a pencil. Being thus collected, the little creatures are killed by hot water or fire, and are called the second gathering, or rather the first of the young ones that have been nourished and raised in the open air. In three or four months more they gather the second brood of those that have been brought forth upon the nopal, and have likewise produced some young ones; which is done much in the same manner as before, only now they take from the plant a great many young ones with their parent insects; and, from the number of small ones found amongst this gathering of cochineal, it is called granilla. In the mean time they keep a number of these young ones alive upon the nopals, which they pluck up or cut down, and take them into their houses, in order to nourish the insects during the rainy season. Lastly, when these are grown large, they put them into the nest, and proceed in the manner above related; so that they usually make three gatherings in a year.

The manner of planting the nopal is, by making rows of holes about half a yard deep, and two yards distant from each other. In each of these holes are placed one or two leaves of the Indian fig-tree, in a flat position, and then they are covered with earth. This leaf soon shoots up into a single stem, which during its growth, divides into several branches, which successively produce fresh leaves, the largest being nearest the stem, and full of knots, as are also the branches, and from these the leaves have their origin. The plant seldom exceeds three yards in height; its blossom is small, of a bright red, and in the shape of a bud, from the centre of which proceeds the fruit. When the fig is ripe, the outward skin becomes white, and yet the pulp is fully impregnated with a deep red, yet few fruits are more pleasant and wholesome. It is remarkable, that this insect does not, in any visible manner, injure the plant, but extracts its nourishment

from the most succulent juice, which it sucks by means of its proboscis, through the fine teguments of the leaves.

There are three ways of killing these insects, viz. by hot water, by little ovens made for that purpose, or by roasting them upon flat stoves with fire under them, such as the Indian women use to bake their bread. These three different methods give the cochineal three different colours. The first makes it of a brown red, the hot water taking off the whiteness that covers the insect when alive. The second makes them of an ash-colour, and marbled; and the third makes them black, as if they had been burnt. Of the old ones that die after bringing forth their young, four pounds, when dried, produce but one, or rather one pound is reduced to four ounces; but three pounds only of the living ones, that have been carefully taken off the nopals, being killed and dried, produce the same quantity.

However, it seems proper to observe, that, though cochineal is now known to be produced by an animal, there is a berry growing in America, which yields a dye almost as beautiful as that of the insect. The first shoots of the tree produce a yellow flower, then comes the fruit which is long, and opens when ripe with a cleft of three or four inches. This fruit is full of kernels or grains, which fall on the least agitation, and are carefully gathered up by the Indians. Eight or ten of these fruits will yield about an ounce of grain; and a person may easily take it for the animal cochineal, but this last is much the most esteemed.

THE NATURAL BRIDGE OF VIRGINIA.

The natural bridge of Virginia, in North America, is one of the most sublime of Nature's works, and consequently demands a place in a work of this nature. It is on the ascent of a hill, which seems to have been cloven through its length by some great convulsion.

The fissure just at the bridge is, by some admeasurements two hundred and seventy feet deep, but by others only two hundred and five. It is about forty-five feet wide at the bottom, and ninety at the top; which of course determines the length of the bridge, and its elevation from the water. Its breadth in the middle is about sixty feet, but more at the ends, and the thickness of the mass at the summit of the arch is about forty feet. A part of this thickness is constituted by a coat of earth, which gives growth to many large trees; and the residue, with the hill on both sides, is one solid rock of lime-stone. The arch approaches the semi-elliptical form, but the larger axis of the ellipses, which would be the cord of the arch, is several times longer than the transverse.

"Though the sides of this bridge," says Mr. Jefferson, "are provided in some parts with a parapet of fixed rocks, yet few persons have resolution to walk over them, and look over into the abyss. You involuntarily fall on your hands and knees, creep to the parapet, and peep over it. Looking down from this height about a minute gave me a violent head-ache. But if the view from the top be painful and intolerable, that from below is delightful in an equal extreme. It is impossible, indeed, for the emotions arising from the sublime to be felt beyond what they are here: so beautiful an arch, so elevated, so light, and springing as it were up to heaven, the rapture of the spectator is really indescribable! The fissure continuing narrow, deep, and straight for a considerable distance above and below the bridge, opens a short, but very pleasing view of the North Mountain on one side, and Blue Ridge on the other, at the distance each of them of about five miles. This bridge is in the county of Rock-bridge, to which it has given name, and affords a public and commodious passage over a valley, which cannot be crossed elsewhere for a considerable distance. The stream passing under it, called Cedar Creek, is the water of James river, and is sufficient in the driest seasons to turn a grist-mill, though its fountain is not more than two miles above."

THE SECRETARY FALCON.

This singular bird, the Secretary Falcon, inhabits the internal parts of Africa, and is frequently seen at the Cape of Good Hope. It is also met with in the Philippine islands. It has the peculiar faculty of striking forwards with its legs, never backwards. Forster mentions a circumstance, which he supposes to be peculiar to this bird; that should it by any accident break the leg, the bone would never unite again. Dr. Solander saw one of these birds take up a snake, small tortoise, or such like, in its claws; and when dashing it against the ground with great violence, if the victim was not killed at first, it repeated the operation till that end was answered; after which it devoured it.

M. Le Vaillant witnessed an engagement between a secretary falcon and a serpent. The battle was obstinate, and was conducted with equal address on both sides. But the serpent at length feeling the inferiority of his strength, employed, in his attempt to regain his hole, all that cunning which is attributed to the tribe; while the bird, apparently guessing his design, stopped him on a sudden and cut off his retreat, by placing herself before him at a single leap. On whatever side the reptile endeavoured to make his escape, his enemy still appeared before him. Then, uniting at once both bravery and cunning, the serpent boldly erected himself to intimidate the bird; and, hissing dreadfully, displayed his menacing throat, inflamed eyes, and a head swollen with rage and venom. Sometimes this threatening appearance produced a momentary suspension of hostilities; but the bird soon returned to the charge, and, covering her body with one of her wings as a buckler, struck her enemy with the bony protuberance of the other. "I saw him (says M. V.) at last stagger and fall: the conqueror then fell upon him to dispatch him, and, with one stroke of her beak, laid open his skull." At this instant M. Le Vaillant fired at and killed the bird. In her craw he found,

on dissection, eleven tolerably large lizards; three serpents, each two feet long; eleven small tortoises, most of which were about two inches in diameter; and a number of locusts and other insects, several of them sufficiently whole. He observed too, that, in addition to this mass of food, the craw contained a sort of ball, as large as the egg of a goose, formed of the vertebræ of serpents and lizards; shells of tortoises; and wings, claws, and shields of different kinds of beetles.

THE ALPS.

The Alps, which divide Italy from France and Germany, are the highest mountains in Europe, being, according to some geometricians, about two miles in perpendicular height. They begin at the Mediterranean; and extending northward, separate Piedmont and Savoy from the adjacent countries, whence directing their course toward the east, they form a boundary between Switzerland and Italy, and terminate near the Adriatic, north-east of Venice.

The prospect from many parts of this range of mountains is peculiarly romantic, especially from the Grand Chartreuse, which is a monastery, said to have been founded about the year 1084. From the village of Echelles to the top of the Chartreuse is a narrow winding road, skirted on one side with umbrageous woods of pine, and on the other by a terrific precipice, at the bottom of which a torrent of water rolls over huge masses of stone, and occasionally precipitates itself down abrupt descents, with a thundering sound, that is rendered still more tremendous by the echo from the neighbouring mountains. This rude scenery, together with the singular views made by the craggs and cliffs, and the numerous cascades which tumble from the very summit into the bosom of the vale, concur to form one of the most solemn and interesting scenes in nature; and to inspire a contemplative spec-

tator with becoming sentiments of reverence for the power, wisdom, and majesty of the Adorable Creator.

Amongst the natural wonders of the Alps, the Glaciers, or valleys of ice, are most particularly deserving of attention; and these may be properly divided into the Upper and Lower Glaciers, the first covering the declivities of the mountains, and the other occupying the intermediate valleys.

The Upper Glaciers may be subdivided into those which cover the summits, and those which extend along the sides of the Alps. Those on the very summit consist chiefly of snow, hardened by the extreme cold; but the sides are incrusted with a mixture of ice and snow, by reason of the superior power of the summer sun to dissolve the snow, which afterwards congeals into ice.

The Lower Glaciers, which are by far the most considerable, extend in some places to a length of several leagues. They do not, however, communicate with each other; few of them being parallel to the central chain, but, stretching mostly in a transverse direction, their higher extremities are bordered by inaccessible rocks, and their lower ones extend into the cultivated valleys. The thickness of the ice appears to vary considerably in different parts; for M. Saussure observes, that in the Glacier de Bois, he did not find it exceed a hundred feet, though he was credibly informed that in other places it was upwards of six hundred feet.

These prodigious masses of ice generally rest on an inclined plane; where, being pushed forward by their own enormous weight, and but weakly supported by the rocks beneath, they are intersected by many large chasms, and exhibit a fantastic appearance of walls, pyramids, &c. The surface of the ice is rough and granulated, so that persons may walk upon it in perfect safety, except in such parts as have a steep descent, or are covered with a collection of earth and stones, which have fallen from the mountains, and is generally known by the appellation of the *Moraine*. A cele-

brated traveller who visited the Glacier de Bois informs us, that its appearance, at a distance, was really tremendous, and that the design of crossing it seemed utterly impracticable. Numerous broad chasms intersected it in every direction; but when the company entered upon it, they found that courage and activity were only required to accomplish their task. Having passed the Moraine, and entered upon the great body of the glacier, they observed an abundance of little rills, which, being produced by the thawing of the ice on the upper parts of the glacier, precipitated themselves into the chasms with a violent noise, increasing the body of waters formed by the melting of the interior surface, and finding an outlet under the immense arch of ice in the valley of Chamouny. "Having proceeded about an hour," says Mr. Coxe, "we were astonished with a view more magnificent than imagination can conceive; hitherto the glaciers had scarcely answered my expectations, but now they far surpassed them. Nature had clad herself in all her terrors. Before us lay a valley of ice, twenty miles in extent, bounded by a circular glacier of pure unbroken snow, surrounded by large conical rocks, terminating in sharp points, like the towers of an ancient fortification; to the right rose a range of magnificent peaks, and far above the rest the magnificent summit of Mount Blanc, which appeared of such immense magnitude, that, at his presence, the circumjacent mountains, however gigantic, seemed to shrink before him, and hide their diminished heads. In half an hour we crossed the Moraine, which forms a boundary of the valley, and proceeded upon a body of ice about three quarters of a mile broad. Then passing a second and third Moraine, we descended upon the last ridge of ice, which was considerably broader than the two former, and full of large chasms." They continued to ascend the glacier, the scene constantly increasing in awful magnificence; and after walking about five miles, they quitted the ice, and gained the top of an eminence called the *Couvercle*, whence they had a most interesting prospect of the surrounding scenery.

In the narrative of Mr. Bouveit's journey to this romantic country, is also a very interesting account of the Prieure, in the valley of Chamouny.—"We had," says he, "the magnificent prospect of a chain of mountains, totally inaccessible, and covered with ice; and above the rest that of Mount Blanc, whose summit seemed to pierce the highest region of clouds. The chain upon which this mountain looks down like a giant, is composed of masses of rock, terminating in spires, which are called the needles, and are ranged like tents in a camp. Their sides appear remarkably light and airy, from the ornaments of several breaks and furrows in the rock itself, as well as from the different streaks of ice and snow, which, without changing the general character of their form, or the majesty of their appearance, give them a picturesque variety. Lower down, the eye surveys, with astonishment, the gills of ice, and the several glaciers, extending almost into the richly cultivated plain; and a picturesque opposition to this chain is formed by innumerable mountains, at the distance of nearly fifty leagues, between whose tops is a partial glimpse of the plains which they environ.

"In the valley of Montanvert," says the same respectable writer, "we beheld a spacious icy plain, upon which there rose a mountain of ice, with steps ascending to the top, and resembling the throne of some divinity. It likewise assumed the form of a grand cascade, whose figure was beyond conception beautiful, and the sun, shining upon it, gave a sparkling brilliance to the whole; while the valley on our right hand was ornamented with prodigious glaciers, that shot up to an immeasurable height between the mountains, and seemed to blend their colours with the skies."

From one of the openings in the valley of Chamouny, the river Arbairon rushes under two arches of ice, composed of many vertical shoots, which resemble the finest crystal, and reflect an infinity of the brightest colours. The Arbairon is a large stream that falls into the Arva, carrying along with it many particles of

gold; and the rivulet of Argentiere flowing from a glacier of the same name, is also enriched with particles of gold and silver.

The Avalanches, or snow-balls, which sometimes gather and roll down the sides of these mountains, are equally surprising and dangerous to travellers. They are occasioned by the dropping of a quantity of snow from some prominent rock, which increases as it falls down the steep declivities, till it becomes of a prodigious size, and sweeps away houses, trees, men, horses, or whatever it meets with in its passage. As they fall suddenly, and with great rapidity, it is very difficult for passengers to avoid them; and nothing is able to resist their force till they get to the bottom, where they are generally broken in pieces by the violence of the shock. Some of these mountain snow-balls have been found, by measuring their track, to be above a hundred yards in diameter; and one of them, in the year 1695, fell upon a village in the night-time, and destroyed eleven houses, besides barns and stables burying men, women, and cattle in the ruins. These terrible accidents are sometimes produced even by the leaping of a chamois, the firing of a pistol, or any noise that shakes the air, and loosens the snow from the rocks above: for which reason, in places of the greatest danger, people are careful to travel early, and with all possible silence. Some of these avalanches indeed are not so destructive; for consisting of new-fallen snow, driven by the wind, they are lighter, and persons buried under them may live a long time without being suffocated, and are often relieved by men kept in pay to clear the roads, and give assistance on such occasions.

The manner of crossing the Alps in some places is extremely curious: the inhabitants of Mount Cennis, who run up steep acclivities, loaded with the most heavy burdens, without suffering the least inconvenience, carry a person directly up a mountain, whose height is a good hour's journey, without panting or resting; and, on the plain above, proceed with amazing dispatch. Then, having refitted the chairs, which is

done in a few minutes, they carry the company over the worst part of the way, for two hours together, making only four pauses, and those very short ones:—such is the effect of custom, and of the simple diet, to which they owe their uncommon longevity, many of them attaining to above an hundred years of age. Milk is their usual food, and they seldom taste any wine. To secure their footing, their shoes are without heels, and the soles rubbed with wax and rosin. The machines in which they are carried, are a kind of straw chairs, with low backs, two arms, and instead of feet, a little board hanging down by cords, for resting the traveller's legs. The seat, which is made of bark and ropes twisted together, is fastened to two poles, and carried like a sedan, with broad leathern straps.

During winter, the plain on the top of Mount Cennis, being always covered with snow, is crossed in sledges, drawn by a horse or mule. In some places, the descent is performed in chairs, but from Mount Cennis to Laneburg, it is conducted in a most surprising manner. On the edge of the declivity is a house, where the traveller, getting into a sledge with his guide, slides down with such rapidity, that he is carried about three miles in seven or eight minutes, the swiftness of the motion almost taking away his breath. The guide sits forward, steering with a stick, and has on each side an iron chain, which he drops like an anchor, either to slacken or stop the course of the sledge.

In some of these mountains the river Arva runs for many miles between high, craggy, and inaccessible rocks, which seem as if split on purpose, to give its rapid waters a free passage. The astonishing echos and continual sounds occasioned by its streams, the trampling of the horses and mules, and the hallooing of passengers in these places, are reverberated several times, with such amazing loudness, as fills a stranger with emotions of indescribable terror; and the firing of a gun or pistol, is here more dreadful than the loudest clap of thunder. The great cataracts of the river

are, in several places, more or less loud and terrible according as the waters are swelled by the melting snows, with which the tops of the mountains are covered. One in particular falls with great noise and violence from a prodigious high rock, above eleven hundred feet.

It has been already observed, that the Alps are the highest mountains in Europe, not only from barometrical observations, but because they give rise to those rivers which water all the countries around them; and they may probably vie in height with most of the considerable mountains in other parts of the globe. The Joch, a high mountain in the territory of Engelberg, bordering upon the canton of Bern, has been found by the falling of the mercury in the barometer, according to Dr. Scheuchzer's calculation, to be five thousand nine hundred and twenty-six feet above the level of the sea: and yet this is far from being the highest mountain in that neighbourhood, for next to it rises another called Titlisberg, covered with perpetual snow, which is at least a thousand feet higher. The Gemmi is a very lofty mountain, over which there is a passage, but only in the summer, from the canton of Bern to Leuck in Valesia. The descent on the south side of this mountain is steep and frightful beyond description, being a narrow path cut on the side of almost perpendicular precipices, and sometimes the passenger is compelled to cross over the clefts on planks or quivering wooden bridges. The height of this mountain, at a cottage called Zur Dauben, appears by the barometer to be six thousand and twelve feet, being the highest part of it that is passable. As to the Avicula, the St. Gothard, the Furea, the Grimsula, the Crispalt, and a long chain of other mountains, which begin in the Upper Valais, traverse the canton of Uri, and run across the country of the Grisons towards Tyrol, their greatest height above the level of the sea may be fixed in round numbers at seven thousand five hundred, or eight thousand feet. But the highest of all the mountains of Switzerland is the Stella, or Piz Stail, in the country of the Grisons,

the perpendicular height of which is nine thousand five hundred and eighty-five feet, according to the computation of Dr. Scheuchzer, or twelve thousand one hundred and ninety-six, according to that of Cassini. Mr. Martel, when he visited the glaciers of Savoy, calculated the height of Mount Blanc to be twelve thousand four hundred and fifty-nine feet above the level of the Rhone at Geneva. These stupendous mountains, however, are far inferior to the Andes.

The Appenines are another chain of lofty mountains, which extend entirely through Italy, from the north-west to the south-east, and which give rise to several rivers and brooks that fertilize the circumjacent country.

MOUNT VESUVIUS AND ETNA.

Besides the Alps and Appenines, Italy is universally celebrated on account of its two volcanic mountains, Vesuvius near Naples, and Etna near Catania, in Sicily.

Mount Vesuvius is situated at the distance of five Italian miles from the city of Naples, and is justly accounted one of the most dreadful volcanos in the world. Its declivity toward the sea is richly clothed with vines and fruit-trees, the circumambient air is clear and salubrious, and the neighbouring plain affords a most delightful prospect; but the ascent to the summit is painfully tedious; and, after walking two miles over a kind of burnt earth mixed with calcined stones and cinders, the traveller arrives at a naked plain, from several parts of which issues a sulphureous smoke, and in the centre of it rises another hill, shaped like a sugar-loaf, and of more difficult access than the former.

At the summit of this hill is a vast mouth or cavity, about four hundred yards in diameter at the top, but shelving down on all sides like a funnel, whence proceeds a continual smoke, and sometimes those asto-

nishing eruptions of flame, ashes, and burning matter, which fill the neighbouring villages with consternation. Every time it darts forth its flames, and pours forth its liquid matter, the exterior form of the mountain, as well as its height, receive considerable alterations. In a small plain, resembling a half moon, situated between the mountain of cinders and a semi-circular theatre of steep rocks, two hundred feet high, M. de la Condamine viewed closely the breathing holes, opened in the sides of the mountain, through which, at the time of a late eruption, those torrents of enflamed matter had escaped, to which they give the name of lava, and with which all this valley is filled. "This singular spectacle presents us," says he, "with the appearance of metallic waves grown cold, and in a state of congelation. One may form a slight idea of it, by supposing to ourselves a sea of thick and tenacious matter, the waves of which were beginning to subside. This sea had its isles, which are solitary masses, resembling hollow spungy rocks, opening into arcades and grottos, fantastically formed, beneath which the burning liquid matter had opened itself magazines or reservoirs similar to furnaces. These grottos, with their vaults, and pillars, all the pure work of nature, were loaded with scoriæ, suspended around them, in the form of stalactites, or irregular clusters of grapes, of various colours.

In ancient history, we find dismal accounts of the devastations occasioned by this volcano; and in later ages, we meet with instances of its raging with extraordinary fury. In the year 1694, there was a violent eruption, which continued great part of the month of April, and threw up ashes, stones, &c. with such force, that some of them reached Benevento, nearly thirty miles distant. A prodigious quantity of melted minerals was likewise thrown out of the mouth, and ran slowly down the sides of the mountain, insomuch that great numbers of men were employed to cut trenches and channels to receive it, and prevent its spreading over the plains below. At this time, when the wind

was in the east, the houses and streets of Naples were literally covered with ashes.

In the summer of 1707, there happened another terrible eruption, attended with such a rumbling and bellowing of the mountain, as far exceeded the report of the largest artillery. Having thrown up clouds of ashes into the air for several days and nights, and a shower of stones that killed both men and cattle, it began to throw out a liquid torrent of bitumen, which resembled a gentle stream of fire, and cooling in its progress, became as hard as flint at the bottom, but more porous and spungy on the surface. After this, frequent flashes of fire, like lightning, proceeded from its mouth, followed by loud claps of thunder; and such a thick cloud of ashes hovered over Naples, that the darkness was equal to that of midnight. Next day, by the shifting of the wind, the ashes were driven another way; and the mountain having raged after this manner about fifteen days, the eruption entirely ceased.

Mr. Edward Berkeley, afterwards bishop of Clogher, in Ireland, gives the following description of an eruption which happened in the year 1717. On the 5th of June, the mountain was observed to throw a little out of the crater, and the same continued the day following. The 7th, in the evening, it began a hideous bellowing, which continued till noon the next day, causing the windows and even the houses in Naples to shake. From that time it vomited vast quantities of melted matter to the south, which streamed down the side of the mountain, like a pot boiling over. On the 10th, it roared and groaned most dreadfully; of which one cannot form a juster idea, than by imagining a mixed sound, made up of the raging of a tempest, the murmur of a troubled sea, and the roaring of thunder and artillery confused together. This induced our author, with three or four more in company, to visit the mountain; and they arrived at the burning river about midnight, when the roaring of the volcano was exceeding loud and horrible. There was a mixture of colours in the cloud over the crater, a ruddy dismal

light in the air over the fiery torrent, and ashes continually showering upon their heads; all which circumstances, augmented by the horror and silence of the night, made a most uncommon and astonishing scene. "Imagine," says he, "a vast torrent of liquid fire rolling along the side of a mountain, and with incredible fury bearing down vines, olives, fig-trees, houses, and every thing that stood in its way." The largest stream seemed half a mile broad at least, and five miles long; and Mr. Berkeley walked so far up the mountain by the side of this burning river, that he was obliged to retire with precipitation, the sulphureous stream having surprised him, and almost taken away his breath. They returned about three in the morning, hearing constantly the murmur and groaning of the mountain, which occasionally burst into louder peals, throwing up huge spouts of fire and burning stones, which in their fall resembled the stars in our rockets. Sometimes there appeared two or three distinct columns of flame, and sometimes only a single one, that seemed to fill the whole crater. It was judged that the flames and fiery stones were shot more than a thousand feet perpendicular above the summit of the volcano; which continued raging in this manner, more or less, till the 18th, when the whole appearance ended, and the mountain remained perfectly quiet. During this eruption, the cinders showered down so fast at Naples, that the citizens were obliged to screen themselves beneath umbrellas; and vessels at the distance of twenty leagues were exposed to equal inconvenience.

In 1779, another eruption happened, which has been particularly described by Sir William Hamilton, in the Philosophical Transactions. This gentleman, during his residence at Naples, had an opportunity of making several observations on the lavas of Vesuvius, and found that they constantly formed regular channels in the mountain. These channels, after small eruptions, were generally from two to six feet wide, and about eight in depth; and were often hid from the sight by a quantity of scoriæ, that had formed a

kind of crust over them. Sir William walked in some of these subterraneous galleries, which appeared extremely curious, some being remarkably smooth and even on the top, sides, and bottom; and others encrusted with a remarkable scoriæ, beautifully ramified with salts, in the form of depending stalactites, &c.

On viewing a stream of lava in its fluid state, our author perceived that, after passing through the above-mentioned channels, it extended into the valley, and flowed gently along, like a river that had been frozen and had masses of ice floating upon it. Being greatly incommoded by the smoke, he passed over the heated crust, and walked along the side of the current to its very source. Here he perceived it boiling violently out of the ground, with a hissing and crackling noise, like that of an artificial fire-work. A hillock about fifteen feet high was formed by the splashing up of the vitrified matter; and under this was an arched hollow, whence the lava issued into a regular channel, raised upon a wall of scoriæ and cinders, nearly ten feet high, and greatly resembling an ancient aqueduct. On leaving this spot, Sir William proceeded up to the crater, where he found the little mountain discharging stones and red-hot scoriæ with loud explosions; but the intolerable smoke and stench of sulphur soon compelled him to retire.

By the eruption which happened in this year (1779), the curious channels of scoriæ were destroyed, and the cone of the mountain was entirely covered with a stratum of lava, from the cracks of which issued a sulphureous smoke, that tinged the cinders with a yellow or whitish tint. The pores of this lava generally abounded with perfect vitrification, and the scoriæ, if viewed through a magnifying glass, appeared like a confused mass of filaments of a foul vitrification. When a piece of the solid lava had been cracked in its fall without totally separating, fibres of perfect glass might be seen, reaching from side to side within the cracks. This kind of volcanic glass is of a dirty yellow colour, and has much the same transparency with our common glass bottles; but when large pieces of

it are broken off by a hammer, it appears perfectly opaque.

In the summer of 1794, another dreadful eruption took place at Vesuvius, which destroyed many of the adjacent villages, and was attended by many surprising phenomena. According to the account of Sir William Hamilton (who has been justly styled the Natural Historian of Vesuvius) the eruption was preceded by a powerful shock of an earthquake, which extended over the whole of the Campagna Felice, and was plainly felt at the distance of forty miles.

"On Sunday (says our author) the 15th of June, another shock was felt at Naples, but did not appear quite so violent as that of the 12th, nor did it continue so long: at the same moment, a fountain of bright fire, attended with very black smoke and a loud report, issued from the middle of the cone of Vesuvius. Soon after, a similar one broke out at some distance lower down; and then it appeared as if the lava had taken its course directly up the steep cone of the volcano. Fresh fountains quickly succeeded, and all in a direct line, flowing toward the towns of Resina and Torre del Greco. It is impossible that any description can give an adequate idea of this fiery scene, or of the horrid noises that attended this great operation of nature. It was a mixture of the loudest thunder with incessant reports, like those from a heavy artillery, accompanied by a continued hollow murmur, like the roaring of the ocean during a violent storm; and added to these was another blowing noise, like that of a large flight of sky-rockets. The frequent falling of the huge stones and scoriæ, which were thrown up to an incredible height, and one of which measured thirty-five feet in circumference, contributed to the concussion of the earth and air, which kept all the houses in Naples in a constant tremor for several hours, every door and window shaking, and the bells ringing incessantly. This was an awful moment! The sky, from a bright full moon and star-light, began to be obscured; the moon gradually seemed to suffer an eclipse, and was soon lost in obscurity; and the prayers

and lamentations of a numerous populace parading the streets, added likewise to the general horror.

"About four o'clock in the morning of the 16th, the crater of Vesuvius began to show signs of being open, by some black smoke issuing out of it, and at day-break another smoke tinged with red issued from an aperture near the crater; whilst a considerable stream of lava issued from the other side of the mountain, and ran with great velocity through a wood, which it destroyed. The conical part of Vesuvius was totally involved in dark clouds; but above these we could often discern fresh columns of smoke rising furiously from the crater, until the whole mass remained in the usual form of a pine-tree, and amidst that gigantic mass of clouds, the volcanic lightning was frequently visible.

"About five o'clock on the morning of the 16th, we perceived that the lava which had broke out from several new mouths on the south side of the mountain, had reached the sea, and was running into it, having overwhelmed and burnt the greatest part of Torre del Greco. Soon after the beginning of this eruption, ashes fell thick at the foot of the mountain, from Portici to the Torre del Greco, and although there were not at that time any clouds in the air, except those of smoke from the mountain, the ashes were accompanied with large drops of water, and the road was as wet as if there had been a heavy shower of rain.

"By the time the lava had reached the sea, Vesuvius was so completely involved in darkness, that we could no longer discern the violent operation of nature that was going on there; but the dreadful noises we heard at times, and the red tinge on the highest clouds were evident signs of the activity of the fire underneath.

"The lava (continues our author), ran but slowly at Torre del Greco after it had reached the sea; and on the morning of the 17th, when I went in my boat to visit that unfortunate town, its course was stopped, excepting that at times a small rivulet of liquid fire

issued from under the smoking scoriæ into the sea, discovering it to be red hot under that surface. I observed that the sea-water was boiling, as in a caldron, where it washed the foot of a new-formed promontory; and although I was a hundred yards distant from it, the pitch from the bottom of my boat was observed to melt away, and we therefore retired hastily from this spot.

"On Wednesday, June 18, the wind having, for a short time, cleared away the thick clouds from the summit of Vesuvius, we discovered that a great part of its crater had fallen in, and that the ashes which before were as fine as Spanish snuff, were now of such density as to appear to have the greatest difficulty in forcing their passage. One cloud heaped on another, and succeeding each other incessantly, formed, in a few hours, such a gigantic column over the mountain, as seemed to threaten Naples with immediate destruction, bending over the city, and appearing much too ponderous to remain long suspended in the air.

"Vesuvius was, at this time, completely covered with a thick coat of light grey ashes, which gave it a horrid appearance; and in comparison of the above-mentioned mass of clouds, it appeared like a mole-hill, although the perpendicular height of the mountain is upwards of three thousand six hundred feet.

"The storms of thunder and lightning occasionally attended with heavy falls of rain and ashes, causing the most destructive torrents of water and glutinous mud, mixed with huge stones, and trees torn up by the roots, continued to afflict the inhabitants on both sides of the volcano, until the 7th of July, when the last torrent destroyed many hundred acres of cultivated land between the towns of Torre del Greco and Torre del Annunziata.

On the 30th of June, Sir William ventured to ascend the volcanic mountain, but not without considerable risk. "The crater (says he), except at short intervals, had been continually obscured by clouds, ever since the 16th, and was so this day, with frequent flashes of lightning, and attended, as usual, with a noise like

that of thunder. I went up the usual way by Resina, and observed, in passing through the village, that many of the stones of the pavement had been loosened; and were deranged by the earthquakes. The leaves of all the vines were burnt by the ashes that had fallen on them, and many of the vines themselves were completely buried. In short, nothing but ruin and desolation was to be seen. The ashes at the foot of the mountain were about ten inches thick on the surface of the earth, but in proportion as we ascended, their thickness increased to several feet; so that the surface of the old rugged lavas was now become a perfect plain. We ascended to the spot whence the lava of the 15th had issued, and we followed its course, which was still very hot, down to the sea at Torre del Greco, which is more than five miles. The horrid chasms from the spot where the late eruption took place, in a straight line for nearly two miles toward the sea, cannot be imagined. They formed valleys more than two hundred feet deep, and from half a mile to a mile wide; and where the fountains of fiery matter existed during the eruption, are little mountains with deep craters. Ten thousand men in as many years could not, surely, make such an alteration on the face of Vesuvius, as has been made by nature in the space of a few hours."

It has been observed, however, that though Mount Vesuvius often fills the neighbouring country with terror, yet as few things in nature are so absolutely noxious as not to produce some good, even this raging volcano, by its sulphureous and nitrous manure, and the heat of its subterraneous fire, contributes to the uncommon fertility of the country, and the profusion of fruit, herbage, &c. with which it is every where covered. Those are observed to be the most fertile spots which abound in sulphur, salt-petre, &c. and if such igneous and inflammable substances were pent up, their fermentations and ebullition would be productive of the most calamitous effects; whereas, they find a vent through these volcanos. Experience shows, that earthquakes, after any continued eruptions of

Vesuvius, are neither so frequent, nor produce such fatal effects as at other times. Hence the inhabitants are far from being alarmed at this mountain's vernal eruptions, when they are not violent; and the air is so far from being rendered unhealthy by them, that Barra, a village at the foot of Vesuvius, near the sea, is remarkable for its healthfulness. To these advantages it may be added, that M. de la Condamine observes, that the above lava, or liquid matter, on its cooling, forms solid masses, surpassing in hardness even that of marble; whence tables, chimney-pieces, and even snuff-boxes are made of it. With this matter the cities of Naples and Rome are paved, as are also a great part of the ancient Roman highways.

Mount Etna, in the island of Sicily, appears to have been well known to the ancients, on account of its fiery eruptions; for Pindar speaks of it as a volcano, and Plato was invited by the younger Dionysius to examine the state of the mountain after the sixth eruption. It threw out flames and lava about a hundred times between that period and the battle of Pharsalia, and was remarkably furious while Sextus Pompeius was adding the horrors of a sanguinary war to its terrific devastations. Charlemagne is said to have been at Catania during one of its eruptions; and since his reign we find fifteen more recorded.

With respect to the dimensions of Mount Etna, it is extremely difficult to extract any thing consistent, even from the accounts of modern and truly respectable travellers. Pindar, who flourished about four hundred and thirty-five years before the Christian era, calls it the "Pillar of Heaven," on account of its astonishing elevation; and all the moderns agree that it is extremely high and large, but they differ excessively in their descriptions; some making it eight or twelve miles high, and a hundred and eighty miles round, while others reduce it to about two miles in height, and somewhat less than ninety miles in circumference. After investigating these different relations, and considering their prodigious difference, we must give it as

our opinion, that the true dimensions of the mountain have not yet been accurately ascertained.

Concerning the general appearance and products of Etna, authors are better agreed; and the journey from Catania to its summit has been recently described by three ingenious travellers—M. D'Orville, Mr. Brydone, and Sir William Hamilton; all of whom affirm, that this mountain affords an epitome of the different climates throughout the world. Towards the base it is extremely hot; farther up more temperate; and grows gradually more cold, till at length the traveller perceives that its head is envelóped in a mantle of eternal snow.

The top of Mount Etna being above the common region of vapours, the prospects from thence are peculiarly interesting, and the heavens appear to possess an extraordinary splendour. Mr. Brydone and his companions observed, as they ascended at night, that the number of stars seemed to be greatly augmented; that each of them sparkled with unusual brilliance; and that the whiteness of the milky-way resembled a pure flame shooting across the skies. To have a clear and ample prospect from this mountain, it is necessary to ascend before sun-rise, as the vapours raised by the sun in the day-time, tend to obscure the circumjacent scenery. Here Sir William Hamilton and Mr. Brydone had a delightful view of Calabria, in Italy, with the sea beyond it; the Lipari islands, and Stromboli, a volcano at seventy miles distance, seemed to be just under their feet; the island of Sicily, with its rivers, towns, and harbours, appeared as distinct as if delineated on a map; and the pyramidal shadow of the mountain reached entirely across the island, and far into the sea on the other side, forming a visible tract in the air, which is gradually shortened as the sun rises above the horizon.

Etna is divided into three regions—the *Regione Culta*, or cultivated; the *Sylvosa*, or woody; and the *Deserta*, or desart region; all of which are plainly distinguished from the summit. The *Regione Culta* is much broader than the rest, and extends on all

sides from the foot of the mountain, being bounded by the sea on the south and south-east, and on the other sides by the rivers Semetus and Alcantara. Here terrible devastations are sometimes committed by the eruptions, and the whole region abounds with little conical mountains. The *Regione Sylvosa* forms a circle of beautiful green, surrounding the mountain on every side, and variegated, like the former, by a number of mountains of a conical form, thrown up by the eruptions which burst out of the sides of the volcano. Mr. Hamilton counted forty-four on the Catania side, each having its crater, and being prettily feathered with trees, which seem to have acquired a wonderful degree of fertility. The *Regione Deserta* is marked out by a circle of snow and ice, which extends on all sides to the distance of eight miles, beginning at the foot of the crater.

In the middle of the snowy region stands the great mouth of the volcano, which Sir William Hamilton describes as a little mountain about a quarter of a mile perpendicular, and situated in the centre of a gently-inclining plain of about nine miles in circumference. In the middle of this little mountain is a large hollow, the inside of which is incrusted with salts and sulphur of different colours. From many parts of this aperture issue volumes of sulphureous smoke, which, being heavier than the circumambient air, roll down the side of the mountain, till, coming to a more dense atmosphere, it shoots off horizontally, and forms a tract in the air according to the direction of the wind. In the midst of this funnel is the terrific and unfathomable gulph, whence continually issue terrible and confused noises, which, during an eruption, may be heard at a prodigious distance. Sir William Hamilton and Mr. Brydone found the crater too hot to admit of their descending into it; but M. D'Orville and his fellow-traveller, having fastened themselves with ropes which some men held at a distance, descended as near as possible to the brink of the gulf; where they saw distinctly a conical mass of matter, which rose to the height of about sixty feet, and

seemed to be about six hundred feet in circumference toward the base. Whilst they were viewing this substance, the internal roarings augmented, and the mountain began to send forth smoke and ashes, but after a momentary dilation the volcano resumed its former tranquillity.

About a mile below the foot of the great crater, are the ruins of an ancient structure, called Il Torre del Filosofo, which some imagine to have been built by the philosopher Empedocles, and others suppose to have been a temple of Vulcan. These ruins are of brick, and seem to have been ornamented with marble.

The woody region, particularly on the east side, abounds with large chesnut-trees, one of which has been called, from its extraordinary size, *Castagno de Cento Cavalli*, or the chesnut-tree of a hundred horse. Mr. Brydone was much disappointed at the sight of this tree, as he found it to be only a bush of five large ones growing together; but his guides assured him, that all these were once united in one stem; and Signior Recupero asserted, that having caused some peasants to dig round this bush of trees, he had found all the stems united under ground in one root. The space of ground occupied by these five trees measured two hundred and four feet in circumference. Another of these trees, called the *Castaga de Galia*, rises from one solid stem to a considerable height, and its circumference at a small distance from the ground is seventy-six feet; and Massa, one of the most respectable Sicilian authors, asserts, that he has seen solid oaks there upwards of forty feet round.

At the foot of a mountain raised by the eruption in 1669, is a hole, leading to several subterraneous caverns, some of which afford an asylum to wild pigeons, and others are used as magazines for snow. Here also is the river Acis (celebrated in the fable of Acis and Galatea), which bursts out of the earth in a large stream, runs with surprising rapidity, and about a mile from its source falls into the sea. Its water is remarkably clear, but being excessively cold, and strongly

impregnated with vitriol, it is reckoned dangerous to drink it.

The great eruption of this volcano, in 1669, broke out on the 11th of March, two hours before night, on the south-east side of the mountain, about twenty miles from the old mouth, and ten from the city of Catania. The noise of the eruption was heard a hundred miles off, to which distance the ashes were likewise carried. The matter thrown out was a stream of metals and minerals, rendered liquid by the fierceness of the fire, which boiled up at the mouth like water at the head of a great river; and having run a little way, the extremity thereof began to crust and curdle, turning into hard porous stones called sciarri, resembling large cakes of burning sea-coal. These came rolling over each other, bearing down any common building by their weight, and burning whatever was combustible. At first the progress of this inundation was at the rate of three miles in twenty-four hours, but afterwards it scarcely advanced a furlong in a day; and thus it continued for fifteen or twenty days together, running into the sea, close by the walls of Catania. At length it made its way over the walls into the city, where, however, it did no considerable damage, except to a convent of Benedictines. In its course it overwhelmed fourteen towns and villages, containing three or four thousand inhabitants; and it is remarkable, that during the whole time of this eruption, which was fifty-four days, neither sun nor stars appeared.

But though Catania had this time the good fortune to escape the threatened destruction, it was almost totally ruined in 1692, by an earthquake, which was not only felt all over Sicily, but likewise in Naples and Malta; and the shock was so violent, that people could not stand upon their legs, and those who lay upon the ground were tossed from side to side, as if upon a rolling billow. The earth opened in several places, throwing up large quantities of water; and great numbers perished in their houses by the fall of rocks that were loosened and rent from the mountains. The sea was violently agitated, and roared dreadfully,

Mount Etna threw up vast spires of flame, and the shock was attended with a noise exceeding the loudest claps of thunder. Fifty-four cities and towns, with an incredible number of villages, were either destroyed or greatly damaged; and it was computed that near sixty thousand persons perished in different parts of the island, of whom eighteen thousand were inhabitants of Catania, very few escaping the general and sudden destruction of that city.

In the eruption which happened in 1766, the lava sprung up into the air to a very considerable height; but the stream which it formed was only six miles in length, and one mile in breadth.—The last eruption happened in 1787.—On the 11th of July there was a subterraneous noise, followed by a copious discharge of black smoke. It was then calm till the 15th, when the same prognostics recurred; on the 17th the subterraneous noise was augmented, the smoke issued out in greater abundance, some slight shocks of an earthquake were felt, and a rivulet of lava began to flow from behind one of the little mountains which form the double head of Etna. On the 18th some new shocks were perceived, and the mountain threw out a thick smoke, which darkened the eastern horizon, and was quickly succeeded by showers of black sand, stones, scoriæ, and lava. These appearances continued till sun-set, but then the scene was entirely changed. Several conical flames rose from the volcano; one on the north and another on the south were particularly conspicuous, and rose and fell alternately. At three o'clock in the morning the two heads of the mountain seemed to be cut away, and at their separation was a conical flame, which appeared about two miles high, on a base of a mile and a half in diameter. This cone was still covered with a thick smoke, in which there sometimes appeared very brilliant flashes of lightning, while a jet of flaming matter was thrown to the distance of six or seven miles, and sounds like the explosion of cannon, were frequently heard at a small distance. From the 20th to the 22nd, these terrific appearances gradually subsided, and the

stream of lava was carried towards Bronte, and the plain of Lago. Subsequent to this eruption, the top of the mountain on the western side was covered with hardened lava, stones, and scoriæ, and travellers were dreadfully annoyed by smoke, showers of sand, nephritic vapours, and excessive heat. The lava on the western head of the mountain had evidently been in a state of fusion; and the odour which rose from one of the spiracula was that of liver of sulphur.

JERUSALEM AND ITS NEIGHBOURHOOD.

Jeruslem, according to Josephus, was the capital of Melchisedek's dominions, called Salem in the book of Genesis: and the Arabs assert that it was built in honour of Melchisedek, by twelve neighbouring princes. No satisfactory account is given of it, however, till the time of king David, who wrested it from the Jebusites, and made it the capital of his kingdom.

From this time it flourished under the peculiar blessing of the Deity, till the iniquity and ingratitude of the Jews provoked their Divine Patron to pour out his judgments upon them, and to give his holy city into the hands of the heathen. It was first reduced, in the days of Joash, by Hazael, king of Syria, who massacred all the nobility, but did not destroy the city. It was afterwards taken by Nebuchadnezzar, king of Babylon, who destroyed it, and carried the inhabitants into captivity. Seventy years after this event, it was rebuilt by permission of Cyrus, king of Persia; and it continued to be the capital of Judea, (though frequently suffering from the monarchs of Syria and Egypt) till the time of Vespasian, emperor of Rome, when our Saviour's awful predictions were accomplished in its utter destruction.

It was rebuilt by Adrian, and seemed likely to have recovered something of its former grandeur; being surrounded with walls, and adorned with several handsome buildings. But this appears to have been a

short-lived change; for when the empress Helena visited the city, she found it in a most ruinous condition. Having formed a design of restoring it to its pristine lustre, she ordered all the rubbish that had been thrown upon Mount Calvary to be removed, and caused a magnificent church to be built, which enenclosed several of the scenes of our Redeemer's sufferings.

The vile apostate Julian formed a design of rebuilding the temple of Jerusalem, and of restoring the Jewish worship, in order to give the lie to the prophecies of our blessed Lord, that the temple should be totally destroyed, without one stone being left upon another, and that the city should be trodden down of the Gentiles till the times of the Gentiles were fulfilled. In this impious attempt, however, the emperor was frustrated, by a partial earthquake and fiery eruption, which totally destroyed the work, consumed the materials that had been collected, and killed a great number of the workmen.

Jerusalem continued in the hands of the eastern emperors till the time of the caliph Omar, who reduced it under his dominion. It remained subject to the Saracens till the year 1099, when it was taken by the crusaders, and made the capital of a Christian kingdom, which subsisted about eighty-eight years, but was, at length, overthrown by Saladin, sultan of Egypt. And in 1217, the Saracens were expelled by the Turks, who are its present masters.

In its most flourishing state, Jerusalem was divided into four parts, each enclosed within its own walls, viz.—1. The old city of Jebus, on Mount Zion, which became the residence of David and his successors, and was therefore called "the city of David." 2. The lower city, called "the daughter of Zion," on which stood the two magnificent palaces which Solomon built for himself and his queen; that of the Maccabean princes; the strong citadel built by Antiochus to overlook the temple; and the stately amphitheatre, built by Herod, capable of containing eighty thousand spectators. 3. The new city, which was chiefly inhabited

by merchants, artificers, and tradesmen. 4. Mount Moriah, on which was built the famous temple of Solomon, and that erected by the Jews on their return from Babylon, and afterwards built almost anew, and sumptuously adorned by Herod the Great.

At present, however, Jerusalem is a poor and thinly inhabited town, about three miles in circumference, situated on a rocky mountain, with steep ascents on all sides except the north, and surrounded by a deep valley, which is again encompassed with hills at a moderate distance. The private buildings are very mean, the streets narrow, and several of them full of ruins. It must likewise be observed, that the situation of the present Jerusalem is very different from that of the ancient city; for Mount Calvary, which was formerly appropriated to the execution of malefactors, was shut out of the walls as a polluted place, whereas since our Saviour's suffering upon it, the reverence paid to it by the Christians has occasioned such an alteration, that it now stands almost in the centre of the city, and, on the contrary, mount Sion, the most eminent part of old Jerusalem, is now left without the walls. In short, the only thing that renders Jerusalem considerable in the present day, is the great resort of pilgrims thither; and the accommodating them with provisions, seems to be the principal business of the inhabitants.

It is against Easter that the Christian pilgrims repair to Jerusalem in the greatest numbers to attend the religious solemnity of that season in the church of the Holy Sepulchre.

The length of this church, which is built upon Mount Calvary, is about a hundred paces, and its width sixty, having at the west end of it a square tower or steeple, which appears rather ruinous; but the edifice in general is kept in good repair, and looks sumptuous and majestic. The nave or body of the church is round, and has two circular galleries, one above another, supported by large square pillars, formerly faced with white marble. Here are several Mosaic pictures in concave niches, representing prophets,

apostles, &c. and amongst the rest are the figures of the emperor Constantine, and his mother Helena, the foundress of the building. This part of the church is covered with a dome, sustained by rafters of cedar, having an opening at top, through which it receives a sufficient light. Exactly under this aperture is the holy sepulchre, which at first, was a cave under ground, but the rock about it having been cut away, it is now considerably above the pavement of the church, and is hewn into the form of a chapel. Pilgrims are forced to creep into this chapel or grotto, the entrance being not above a yard high; but within it is about eight feet square, and as much in height, all cut out of the solid rock, and lined with white marble. The tomb wherein our Lord is supposed to have been laid, is raised in form of an altar, almost three feet from the floor, extending the whole length and half the breadth of this little chapel, so that there is not room for above three persons to kneel without much inconvenience. A great number of lamps, which are kept here continually burning, make the place excessively hot; but the smoke escapes by vent-holes cut through the roof, over which there is a small canopy covered with lead, supported by six double Corinthian columns. The outside of the chapel is likewise adorned with ten beautiful pillars of white marble, adjoining to the wall, and sustaining a cornice.

The choir of this church is not unlike that of our cathedrals. It is separated from the nave by a wall, which has a door opposite to that of the holy sepulchre; and to the east it terminates in a semicircle, where the high altar stands, which is richly gilt, and hung round with the pictures of several saints, painted full-faced after the manner of the Greeks, to whom the choir belongs: but the privilege of saying mass in the chapel of the holy sepulchre is confined to the Latins. A dome of free-stone covers this choir, which is close at top, rough-cast on the outside, and supported by large pillars.

Several parts of this church are distinguished by the name of Holy Places, and looked upon with more

than ordinary veneration, as having some particular actions done in them relating to the sufferings, death, burial, or resurrection of our blessed Saviour; and each of these sacred places has its respective altar. One of these is called the Chapel of Derision, wherein is an altar sustained by two pillars, and underneath it a piece of greyish marble, on which they say the soldiers placed our Saviour when they crowned him with thorns, and mocked him, saying, "Hail King of the Jews." The chapel of the prison is another, being a little dark place, wherein they say our Lord was confined whilst things were preparing for his crucifixion, and where the Greeks keep a lamp continually burning. Another of the holy places is a particular part of Mount Calvary, about twelve yards square, which is left much higher than the floor of the church, having steps to go up to it; and here they pretend to shew the very place where our Saviour was nailed to the cross.

This chapel is covered all over with mosaic work; and in the middle of the pavement are some marble stones of several colours, designed to point out the spot where our Lord's blood fell when his hands and feet were pierced. Here are two altars before which hang sixteen lamps, and a candlestick with twelve branches.

In an adjoining chapel the rock rises above the floor in form of an altar, which is covered with white marble, and in the middle of it is a round hole, about seven inches in diameter, and two feet deep, which is affirmed to be the very same wherein the foot of the cross was fixed, on which Christ suffered; and just by we see a cleft in the rock, which is evidently genuine and natural, and said to be made by the earthquake which happened at that time. This hole is now plated with silver, and on each side of it the places where the two thieves were crucified are represented by two crosses fixed on little marble pedestals.

The stone of unction is about seven feet long, and two broad, adorned all round with a chequered border

of white and red marble, and enclosed within iron-rails, to prevent its being trod upon. It is so called, as being supposed to be the very spot where the Redeemer's body was anointed, and prepared with myrrh and aloes for the burial. To these might be added several other holy places, as that where the soldiers divided our Saviour's garments; where he appeared to Mary Magdalen after his resurrection, &c., all which things are supposed to have been transacted within the narrow limits of this sacred structure.

"If any one (says Le Brun,) be desirous to know the sensations of a person who kneels, for the first time, before the sepulchre of our Lord, I can only answer, for my own part, that I never felt myself so much affected in my life. A monk who visited the sacred tomb with me, and who had never before been at Jerusalem, was so agitated, and shed so many tears, that two full hours had elapsed before he could be brought to himself again. I will not from thence conclude, that this was indisputably the place of Christ's sepulture; but as no serious person can approach this spot without meditating upon the sufferings of him who died for the sins of mankind, his soul, must of necessity, be very deeply affected. And, although we live in an age in which numbers seem to glory in their infidelity, I am firmly of opinion, that the most professed atheist, with all his affected stupidity, could not forbear feeling the same emotions with myself upon such an occasion."

Every day a procession is made in the church of the Holy Sepulchre, in which the monks carry tapers and crucifixes, and sing hymns; but in the holy week before Easter, when the pilgrims flock to Jerusalem, this is performed with extraordinary solemnity.

On Good Friday, all the most material circumstances of our Saviour's passion are represented; such as crowning him with thorns, nailing him to the cross, and then taking the body down, and laying it in the sepulchre. The monks have first a sermon, and then every one takes a lighted taper and a crucifix in his hand to begin the procession. They visit first the

pillar of flagellation; next the prison; afterwards the altar of the division of Christ's garments, and the chapel of derision, from whence they proceed to Mount Calvary, leaving their shoes at the bottom of the stairs.

A pious fraud is performed every Easter-eve, by the Greek priests, which it would be unpardonable to pass over in silence. This is a pretended miraculous flame, which descends into the holy sepulchre, and kindles all the lamps and tapers without human assistance. On entering the church upon one of these occasions, Mr. Maundrell found a multitude of people running round the holy sepulchre in a tumultuous manner, and exclaiming, with the utmost vehemence, Huia! Huia! "That is he! that is he!" Having wearied themselves with their running and vociferation, they performed a thousand antic tricks, dragging and carrying each other, and rolling about in the most indecent manner.

This riotous scene lasted about four hours, at the expiration of which, a procession set out round the sepulchre, and a profusion of standards, streamers, and crucifixes, were ostentatiously displayed. Towards the end of the procession, a pigeon came fluttering into the cupola over the sepulchre, at which the people redoubled their shouts and clamour. The suffragan of the Greek patriarch, and the principal Armenian bishop, then opened the door of the sepulchre, and having caused all the lights to be extinguished, shut themselves in. As the accomplishment of the miracle drew nearer, the acclamations were increased, and the crowd pressed eagerly forward to light their candles at the holy flame as soon as it was produced.

In a few moments after the bishops had been shut up, the glimmering of the holy fire was seen through the chinks of the door, and, soon after, the two prelates came out, with blazing torches in their hands, while the people thronged about them to light their tapers. The mob now testified the most extravagant joy, and an illumination of the church concluded the ceremony.

Upon mount Moriah stands a Turkish mosque, which is frequently called the temple of Solomon, and is supposed to stand upon the same ground that was formerly taken up by the Holy of Holies. It is an octagonal building, covered with a cupola, and though it is neither a large nor elegant structure, it makes a grand appearance from the sole advantage of its situation. The Turks have enclosed the area where Solomon's temple formerly stood, and will not suffer a Christian, on pain of death, to go within its borders; but it may be distinctly viewed from the top of a house called Pilate's palace, and one may plainly see, that it must have cost immense labour to level such a spacious area upon so strong and rocky a mountain.

From this pretended palace of Pilate, wherein the Turkish sangiack now resides, begins what the Christians call the Dolorous Way, that is, the way that our Lord was led to Calvary, which is about a mile distant. In this journey we pass under an old arch that crosses the street, in the side of which is a window, where Pilate is said to have presented Christ to the people, saying, "Behold the Man;" and a little farther are shown the ruins of a church, built on the place where the blessed Virgin is reported to have fallen into a swoon, on seeing her divine son bearing his cross, and used with indignity. We likewise pass by the Gate of Judgment, through which malefactors were anciently led to the place of execution, and which stood in the western wall of Old Jerusalem, but is now considerably within the city.

Amongst other antiquities, they show an ancient building, which is made use of as a prison, and is the very same (they say,) from which St. Peter was delivered by an angel. About a furlong from thence, stands an old church belonging to the Greeks, said to have been erected by the pious Helena, upon the ground where the house of Zebedee formerly stood, who, they tell us, was a fisherman, and used to bring fish from Joppa to Jerusalem. Where the house of Mark stood, to which St. Peter retired after his miraculous deliverance, the Syrians have a small church,

wherein they boast of having a Syriac manuscript of the New Testament about nine hundred years old, and a little stone font, which was used by the apostles.

It would be tedious to enumerate the pretended curiosities with which strangers are amused; and therefore we shall take leave of Jerusalem, after having mentioned a few particulars observable in its neighbourhood. Going out of the city, at the gate of Bethlehem we see Bathsheba's Pool, as it is called, being supposed to be the same wherein the wife of Uriah was washing herself when David discovered her from the terrace of his palace. Passing by this pool, we enter the valley of Hinnom, on the west side whereof is the potter's field, or Aceldama, that is, the field of blood, being purchased by the thirty pieces of silver, the price of the innocent blood of our Saviour. At present it is called the Holy Field, on account of the veneration it has among Christians. The piece of ground is only about thirty yards long, and half as much in breadth, being now the burying-place of the Armenians. One half of it is taken up by a square fabric, near twelve yards high, over which are five openings, in the form of cupolas, large enough to let down a corpse, the flesh whereof it is said to consume in the space of forty-eight hours. The Christians in Jerusalem give implicit credit to this account; but Mr. Maundrell says, that looking through the holes at top, he could see many bodies under several degrees of decay; from whence he conjectures, that this grave does not make such quick dispatch with the corpses committed to it as is commonly reported.

At a small distance from this field is a cave hewn out of the rock, consisting of several rooms one within another, where the apostles are said to have concealed themselves when they forsook their master, on his being apprehended in the garden. This cave, was perhaps at first made for a sepulchre, and might afterwards serve for a hermitage; but it appears to have been formerly adorned with painting and gilding, and some pretend still to discern the pictures of several of the apostles.

In the valley of Jehosaphat, is a well, or rather a dry pit, said to be the place from whence Nehemiah recovered the fire of the altar, which had lain hid there during the time of the Babylonish captivity. On the same side of the valley is the pool of Siloam, whither our Saviour sent the blind man to wash, after having anointed his eyes with earth and spittle. About a furlong from hence is the fountain of the blessed Virgin, to which there is a descent by several steps, the spring lying deep in the cavity of a rock. At no great distance from this place is the spot where Judas is said to have hanged himself after he had betrayed our Saviour; and a little farther, on the same side of the valley, are several Jewish monuments, two of which seem to be valuable antiquities, usually called the Sepulchre of Zacharias and the Pillar of Absalom.

The first of these, supposed to be that of Zacharias, who was slain between the temple and altar, is cut out of a natural rock, and is of a quadrangular form, about six yards high, beautified with Doric columns, which support the cornice; and above that the roof rises in the shape of a pointed diamond. Absalom's pillar is lofty, and its sides and corners are adorned with Doric pilasters; but after it has run a little way in a square form, it changes into a round, and terminates in a point, the top being almost shaped like a bell. A great many stones lie near this monument, thrown there by Turks and Jews, as well as Christians, in detestation of Absalom's rebellion against his father.

The sepulchre of the Blessed Virgin is situated in the same valley, and was constructed at the expence of the empress Helena. That part of it above-ground is a square building, flat at the top; and on the south side of it is a door, from whence there is a descent of about fifty steps. When travellers are half way down, the guides show them on the right hand the sepulchre of Anna, the mother of the Blessed Virgin, and on the left, that of Joseph her husband. At the bottom of the stairs is a spacious church, walled on each side, and arched above with the natural rock. In the

middle of the church is a little square chapel, faced with marble; and opposite to the door is the virgin's tomb, in form of an altar, where the papists affirm that she was buried by the apostles. The Turks, as well as Christians, have a great veneration for this place, and contribute to the charge of eighteen lamps, which are kept here continually burning. Each end of the church is semicircular, in one of which stands the great altar, upon which the light descends from a cupola above, and at the other end is a well of excellent water.

Mount Olivet, or the Mount of Olives, is the loftiest eminence in the neighbourhood of Jerusalem, and is held in extraordinary veneration both by Christians and Mahometans. Half way up the hill are several grottos, called the sepulchres of the prophets; and a little higher is a subterraneous church, consisting of twelve arched vaults. On the top of this hill, from whence the Saviour of the world ascended into heaven, the empress Helena caused a magnificent church and monastery to be erected, the greatest part whereof is now in ruins; but there is a little octagonal chapel still remaining, with a dome over it, sustained by eight pillars of white marble. This is called the chapel of the Ascension, and is at present in the possession of the Mahometans, who make the Christians pay for admission to see a cavity in the rock, which they pretend is the print of one of our Saviour's feet.

Between the foot of Mount Olivet and the brook Cedron, is shown the garden of Gethsemane, a piece of ground about sixty yards square, and planted with olive-trees of an uncommon size, which are said to be the same that grew in the time of our Saviour. At the upper end of the garden is a flat naked rock, where they say the apostles fell asleep during our Lord's agony; and near this place is a grotto, wherein Christ is supposed to have undergone that bitter part of his passion, when his sweat resembled great drops of blood falling to the ground.

From Jerusalem it is usual to make an excursion to Bethlehem, which is now dwindled to a small village, but will be ever memorable as the birth-place of the

Messiah, and, on this account, it is much resorted to by pilgrims. Here is a magnificent church, built over the very spot where our Saviour is supposed to have been born. We enter this edifice through a portico supported by sixteen pillars, and coming into the nave or body of the church, we find its lofty roof, which is of cedar, supported by four rows of marble columns. The choir is large, and terminates in a semicircle, where stands the high altar; and on each hand are two other divisions, with their respective altars. A noble cupola, leaded on the outside, and adorned within with mosaic figures, covers this part of the church; and near the great altar are two flights of marble steps leading into the chapel of the Nativity, where there is an altar, with several lamps continually burning before it. Descending a few steps lower, we are shown the manger where our Lord was laid, which is hewn out of the rock, about two feet high from the floor, and is lined with white marble.

At a little distance from the Latin convent is the grotto of the Virgin, held in great veneration, on account of a tradition that the Virgin Mary hid herself there with her divine son, to avoid the fury of Herod, whilst Joseph made the necessary preparations for their departure into Egypt. It is of a circular form, cut out of a chalky rock, and has an altar in it, where mass is sometimes celebrated.

About four miles south of Bethlehem are those famous fountains or pools, said to have been the contrivance and delight of Solomon. They are three in number, one above another, and so disposed, that the waters of the uppermost descend into the second, and those of the second into the third. Their form is quadrangular, and each of them about ninety paces broad; but with respect to their length they are somewhat different. They are very deep, and lined all round with a wall, except where the natural rock makes it unnecessary; and indeed it must be acknowledged they are a work not unworthy of that wise prince whose name they bear, and contain such a store of excellent spring-water, as perhaps cannot be

found in any other part of Palestine. The remains of an aqueduct, which conveyed water from hence to Jerusalem, are still to be seen, being a sort of coarse marble stones, perforated and let into one another after the manner of pipes, and, for their better preservation, covered over with a case or arch of smaller stones, cemented together with a very durable mortar; and yet as strong as this work has been, the Turks and Arabs have so destroyed it, that though it formerly extended five or six leagues, there are only some fragments of it remaining.

Nazareth, which is celebrated in the Scriptures, as having been the place of our Saviour's residence, previously to his entering on the great work of his ministry, contains some objects worthy of attention. Adammanus, a writer of the seventh century, tells us, that in his time there were two great churches to be seen at Nazareth, one of which was built upon two arches, in the place where our Saviour's house had stood. The second was built on the spot where the angel Gabriel revealed to the Blessed Virgin the mystery of Christ's incarnation; and we are assured that the church of the incarnation is still in being.

Mr. Maundrell observes, that there is a convent built over what is said to be the place of annunciation: for the chamber where Mary received the angel's salutation was removed from Nazareth, (according to the Popish legends) and transported, by angels, to Loretto in Italy.

Mariti tells us, that in the eastern part of the city stands a church dedicated to the Blessed Virgin; and that the zeal of the Cenobites raised it from the ruins of that which had been destroyed by the Saracens. It is a very handsome building, and consists of three naves; in the middle of which is the principal altar, ornamented with magnificent iron balustrades.

The descent to the grotto, or annunciation chapel, is by steps of beautiful marble, cut with great taste; and at the entrance are two columns of oriental granite, which seem intended both to support and ornament the grotto. The altar of this subterraneous

chapel is very elegant, and the different kinds of marble with which it is ornamented, receive an additional lustre from the light of several silver lamps. On solemn festivals, the walls and pilasters are hung with various pieces of superb tapestry, representing the mysteries of the Blessed Virgin.

In the western part of the city stands a Christian church, supposed to occupy the site of the ancient synagogue where our Blessed Master showed the Jews the accomplishment of the prophecies in his own person. In this neighbourhood may be seen a fountain of excellent water, which the Christian inhabitants conjecture to have been used by the Virgin; and at some distance is a large round stone, called "Christ's Table," from a tradition that he sometimes came thither to eat bread with his disciples.

The Mountain of Forty Days, situated in the plain of Jericho, is one of the highest in Palestine, and one of its most sacred places; as it derives its name from the rigorous fast which Christ observed after having triumphed over the vanities of the world, and the powers of hell.

The summit of this mountain is covered neither with shrubs, turf, nor earth; but consists of a solid mass of white marble, the surface of which has become yellow by the injuries of the air. "The path by which you ascend to it," says the Abbe Mariti, "fills one with terror, as it rises, with a winding course, between two abysses, which the eye dares scarcely behold. This path is at first tolerably broad; but at length it becomes so extremely narrow, that it is almost impossible to place both feet upon it at the same time. When we had ascended a little higher, we found an Arab stretched on the path, who required a certain toll for our passage. Here a traveller needs courage. One of the parapets or path being broke, we clung to the remaining part, until we reached a small grotto, which gave us an opportunity of recovering our breath. On resuming our progress, we became exposed to more imminent danger; for, being almost suspended from the rock, and having before

our eyes all the horror of the precipice, we could advance only by dragging one foot after the other: so that if the smallest fragment had given way under us, we must inevitably have been hurried to the bottom.

"Proceeding a little farther, we found a second grotto, the entrance of which was about three yards broad; and it would be very capacious, were not two-thirds of it filled up by part of the roof, which had tumbled in. This grotto conducts to another, which our curiosity induced us to enter; but we were almost stifled by the number of bats that were fluttering about in it. Being desirous of retreating almost as soon as we had entered, the bats flew about us in such a manner as to almost cover our bodies; but they luckily made themselves a passage, and suffered us to breathe with freedom.

"By the glimmering light which reached this grotto, we perceived that the bottom of it was covered to the height of about four inches with the excrements of the bats; and we remarked some niches in the sides, which gave us reason to conclude, that it had once served as a sepulchre to the ancient anchorets. This is the more probable, as the other grotto appears, by the remains of an altar and some Greek paintings, to have been formerly used as a church.

"In the right corner there is a large cistern, the plaster of which retains its original solidity, though broken in a few places; and in the left corner is a small staircase, leading to a third grotto. This is much longer and broader than either of the former, and its walls are ornamented with Greek paintings of the twelve apostles as large as life. But their figures are so much changed, that they could scarcely be distinguished, were it not that their names are written in Greek characters upon the glory which surrounds their heads. At the farther end of the grotto stands a square altar, above which is an oval painting of the Annunciation, in good preservation. No writer has been able to tell us who was the founder of these curious chapels; but it is evident that the chisel has been employed to render the grottos smooth and re-

gular; and it appears that they were inhabited by a number of hermits, who devoted themselves to a life of retirement and holy meditation.

"In remembrance of our Saviour's miraculous fast, a chapel was formerly erected on the summit of the mountain, which may be seen from the plain; but we could not approach it, as the path was almost entirely destroyed. It may be accessible, however, on the other side of the mountain, which we did not visit. Here we enjoyed the most beautiful prospect that can be imagined; for this eminence overlooks the mountains of Arabia, the countries of Ammon and Gilead, the plains of Moab and Jericho, the river Jordan, and the whole extent of the Dead Sea.

THE OSTRICH.

The Ostrich, which is the largest of all birds, frequently attains the height of seven or eight feet, and upwards. Its long and slender neck is clad only with a kind of down. The head is small in proportion to the body; but the eyes are large and vivid. The beak is short, blunt, and flattened horizontally. The feathers have no strength or hardness; their stems are flexible; and the barbs or vanes do not catch upon each other, like those of most other birds. It is this which gives them their tendency to wave, and has caused them to be used as ornaments in head-dress. The wings of the Ostrich are extremely short, when compared with the size of the body; and they are furnished only with these waving and flexible feathers. The thighs and legs are of astonishing strength. The feet have only two toes each, of which the outer one is much shorter than the other, and has no nail or claw.

The sight of the ostrich is very strong; and its hearing is peculiarly good; but the senses of taste and smell are both weak. The Ostrich swallows, indiscriminately with its food, stones, and even pieces of

iron or copper. This habit has induced some writers to assert that the animal could digest iron. The pieces of metal found in the Ostrich's stomach, have, in some instances, appeared not to have been worn, as if by trituration with other hard bodies, but to have been eaten or corroded by some juice, as is evident from the inequality of the hollows or cleft produced by that juice.

In 1804, an Ostrich was brought to New York from the Cape of Good Hope, and died on the first of June following. On the 19th of May, this animal swallowed a small cotton handkerchief: and it picked up, and swallowed, every day, a considerable quantity of gravel, besides many pieces of china, queen's ware, glass, broken nails, and all kinds of metallic substances which it could find, of such size as to be admitted into its stomach. Its usual food was bread, potatoes, corn, and grass, which it continued to eat in great quantity during the first eight days after it had swallowed the handkerchief; but, in the beginning of the second week, it lost its appetite; and it was considered necessary to cram it, in order to keep it alive. This, however, proved ineffectual; and it did not survive more than three or four days. On the day following that of its death, the body was opened in the presence of several medical gentlemen of New York; and, on examination, the stomach was found to be so full, as to be considerably distended. It contained a quantity of partly digested grass, mixed with corn and potatoes undigested; and a great quantity of gravel, pieces of earthenware and glass, some brass buttons, old nails, a piece of a small key, and several other things. The handkerchief was found uninjured on the top of the contents of the stomach; and it was thought that this had caused an indigestion, which had at least accelerated the death of the animal. It could not, however, in all probability, have lived much longer, on account of a general inflammation which was discovered on the outside of the stomach, on the breast and rump, occasioned by some severe bruises which it had received either on board the vessel, or

when it was shipped. The pieces of iron that were found in its stomach, some of which appeared to have been swallowed a great length of time, are said by the examiners to have undergone very little alteration, further than what might be accounted for by their friction against each other, caused by the powerful action of the gizzard.

An Ostrich described by Cuvier, in the Menagerie of the Museum at Paris, was excessively voracious; and, although grain and vegetables constituted the basis of its nourishment, it would indiscriminately devour all kinds of substances, both vegetable and animal. It seemed most fond of barley; and would eat, every day, about four pounds of this, with a pound of bread, and ten or twelve lettuces. In the summer time, it drank four pints of water in the day; and in winter, when it was necessary to keep it confined it would drink more than six. This circumstance completely refutes the assertion of the Arabs, mentioned by Buffon, that the Ostrich never drinks. It very frequently would throw the water over its body, and afterwards roll upon the ground.

Ostriches often become excessive fat. The last mentioned animal, when it was dissected, had fat to the thickness of two or three fingers in several parts of its body.

They have great muscular strength, particularly in the legs; in running, they often throw behind them very heavy stones to a considerable distance. The rapidity of the course of the Ostrich surpasses that of all known animals; and is such, that those persons who mount on its back, without having, by degrees, habituated themselves to the exercise, are at first nearly suffocated. The wings, by beating against the air, serve to accelerate its speed: but they are not of sufficient size to enable the animal to elevate its body in the least degree from the ground.

With respect to instinctive faculties and sagacity, the Ostrich is generally said to be much below most other animals. The people of the countries which it inhabits, consider it even as an emblem of stupidity;

they assert that it will hide its head behind a tree or other object, when pursued by the hunter, and there remain immoveable, as if its whole body was concealed. This, however, is by no means the fact. Its cry is weak, and somewhat resembles the cooing of a pigeon. The voice of the male differs from that of the female, chiefly in being more strong. When the animal is teased, it threatens by a kind of hissing noise, not much unlike that of a goose. It likewise indicates its anger by raising and shaking its wings and tail.

In 1802, a female Ostrich in the Museum at Paris, deposited in the space of two months, six eggs. The one of these which appeared most perfect, and which was as large as most of the eggs of Ostriches that are brought to Europe, was examined in the scales immediately after it was laid, and was found to weigh nearly three pounds. In the exaggerated relations of some naturalists, it is asserted that the eggs of the Ostrich sometimes weigh as much as fifteen pounds. A large shell, preserved in the cabinet of the Academy of Sweden, weighed eleven ounces. It was ten inches and a half in length, and would have contained upwards of four pints of water.

At the Cape of Good Hope, the eggs of Ostriches constitute an important article of commerce. The Arabs frequently carry great quantities of them to Cairo and other towns of Egypt, where they meet with a ready sale, not only as articles of food, but likewise for the purpose of ornamenting the mosques and churches with the shells. The Mahometans of the interior of Africa place the eggs of Ostriches on the top of the spires of their mosques. The shells are frequently employed as ornaments for the persons of the Hottentots. They make collars and girdles of them, by grinding small pieces into the form of rings.

In its wild state, the Ostrich, according to the assertion of Aristotle, lays as many as twenty-five eggs; according to Willoughby and Linnæus, fifty; and, according to Ælian, as many as eighty. This error, says Thunberg, has arisen from an ignorance in those

writers, that the animals were polygamous, and that three or four females deposited their eggs in the same nest. The shells are sufficiently thick to admit of their being cut into, and used as, drinking-vessels. Without the torrid zone, it is said that the Ostriches frequently leave their eggs to be hatched by the heat of the sun; but that within the tropics they incubate in the manner of other birds, and that they will guard and defend their offspring with great courage. The period of incubation is stated to be six weeks.

Buffon asserts that, when Jannequin was in Senegal, two eggs, taken from an Ostrich's nest, having been presented to him, he wrapped them up in tow, and put them into his chest; where, after some time, he discovered, that, from one of the eggs, a young bird had been produced. The folllowing is a translation of the original passage inserted in his Voyage.

"The Ostrich lays very large eggs, and, instead of seeking to conceal them, does not herself sit on, but abandons them to the heat of the sun, leaving them to be hatched by the powerful rays of that eye of the universe. A negro having made me a present of two of these eggs, which I was desirous of carrying to France, I deposited them in my chest, carefully wrapped up in tow, lest they should be broken. They were left here for a long time without being seen; and one day, on opening the chest, I was greatly astonished to find that one of the shells was broken. Without attempting to ascertain by what means the accident had happened, I took it up, with the intention of throwing it out, when, to my infinite surprise, I observed a young Ostrich moving under the thick skin of the egg. As there was no opening in this, I made one with my knife, in order to give the animal air; and I carefully replaced it in the chest. It lived for eight days, during which time I fed it with pieces of vegetables, which it readily took into its beak and swallowed. The same circumstance, no doubt, took place in the other egg; for, on my return to France, I found that the shell of that also was broken."

The Ostrich is an inhabitant of nearly all parts of

Africa, from Barbary almost to the Cape of Good Hope; and it delights principally in arid and sandy desarts. It is likewise very common in Arabia, and is sometimes, though rarely, found in other parts of Asia.

These birds traverse the desarts in great troops. The Arabs pursue them on horseback, and sometimes with dogs; and they occasionally catch them by means of nets and other snares. Those that are taken alive are easily tamed: they will allow men to mount on their backs; but they are by no means so easy to be guided as a horse.

The skin of the ostrich, ornamented with the feathers, serves some of the tribes of the Arabs to make shields and breast-plates. It is well known that the great feathers of the wings and tail are employed in Europe as ornaments for dress, furniture, &c. and they have been used for that purpose from the remotest period.

THE ANDES.

It is generally allowed, that the mountains of South America are not to be paralleled in any other part of the world, for their surprising height and extent; that prodigious chain of them called the Andes, begins in the most northern part of Peru, and extends itself quite to the Straits of Magellan, a length of between three and four thousand miles. Acosta relates, that he once ascended one of the highest of these mountains in Peru, called Pariacaca; and that he went prepared according to the best instructions he could get, with several more who had the like curiosity; but, notwithstanding all his precaution, when he came near the top he was seized with such pains that he thought he should have fallen to the ground: and the rest of the company feeling similar emotions, they all hastened down as fast as they could, without waiting for one another. They were all taken with violent

retchings, and not only brought up green phlegm and choler, but a great deal of blood.

This lasted for three or four hours, till they had descended to the lower part of the mountain; but it seems that the sickness generally goes off before they get to the bottom, and is attended with no ill consequences.

People who pass this ridge of mountains in any part of them, for upwards of five hundred leagues, are affected in like manner, but more in some places than in others. Acosta had passed the Andes at four different places, and always felt the like disorder, but not so much as at Pariacaca; and the best remedy they found against it was to stop their mouths, noses, and ears as much as possible; the air being so subtile and piercing, that it affects the entrails both of men and beasts. This indeed is no wonder, since the height of the Andes is such, that the Alps, in comparison to them, seem but as ordinary houses in regard to lofty towers. Hence our author concluded that the air on the top of these mountains was too pure and subtile for animals to breathe in, they requiring a grosser medium; and this, he supposed, occasioned the above-mentioned disorder in the stomach.

As to the retchings complained of by those who pass the Andes in Peru, it is remarkable that those who travel over that high chain of them in Chili called the Cordillera, are not affected with such disorders, but only with a difficulty of breathing, which is perceived more or less on the tops of all high mountains: so that in Peru there may possible be a concurrence of some other causes besides the thinness of the air, to produce the above effects, since the mountains of Chili are considerably higher, and consequently the air at the top of them is more rarefied.

In order to give a more perfect idea of the climate on the top of these mountains, we shall give some account of that which prevailed on Pichincha, when the mathematicians, sent thither by the kings of France and Spain, were stationed there, in order to make observations on the figure of the earth. It ought to be

observed, that this mountain is almost directly under the equinoctial, and that though it is famous for its great height, it is twelve hundred and seventy-eight yards, in a perpendicular line, lower than the mountain of Cotopaxi; but it will be impossible for the reader to conceive the comparative coldness of the summit of the last-mentioned mountain, from that felt on this, since it must exceed every idea that can be formed in the human mind, though both are situated in the midst of the torrid zone.

Pichincha was formerly a volcano, but the mouth, on one of its sides, is at present covered with sand and calcined matter, and neither fire nor smoke is seen to issue from it. Our learned author Don George Juan de Ulloa observes, that he found the cold on its top extremely intense, and the wind violent: they were also frequently involved in so thick a fog, or, in other words, a cloud, that an object at six or eight paces distance was scarcely perceptible. The air grew clear, by the clouds descending nearer to the surface of the earth, when they, on all sides, surrounded the mountain to a vast distance, representing the sea, with the rock standing like an island in the centre. When this happened, they heard the dreadful noise of the tempests, that discharged themselves on the city of Quito, and the neigbouring country. Looking down, they saw the lightning issue from the clouds, and heard the thunder roll far beneath them. While the lower parts were involved in thunder and rain, they enjoyed a delightful serenity; the wind was abated, the sky clear, and the enlivening rays of the sun moderated the severity of the cold. But, when the clouds rose, their thickness rendered respiration difficult, snow and hail fell continually, and the wind returned with all its violence; so that it was impossible to overcome entirely the fear of being, together with their hut, blown down the precipice, or of being buried in it, by the daily accumulations of ice and snow. Their fears were likewise increased by the fall of enormous fragments of rocks. Though the smallest crevice, vi-

sible in their hut, was stopped, the wind was so piercing, that it penetrated through; and, though the hut was small, crowded with inhabitants, and had several lamps constantly burning, the cold was so great, that every person was obliged to have a chafing-dish of coals, and several men were constantly employed every morning to remove the snow which fell in the night. By the severity of this cold, their feet were swelled, and grew so tender, that they could not walk without extreme pain; their hands also were covered with chilblains, and their lips so swelled and chapped, that every motion in speaking, made them bleed.

From barometrical experiments made on the mountain Cotopaxi, it appears that its summit is elevated six thousand two hundred and fifty-two yards above the surface of the sea, something above three geographical miles, which greatly exceeds the height of any other mountain in the known world. Cotopaxi became a volcano at the first arrival of the Spaniards in this country, and a new eruption happened in 1743, which had been for some days preceded by a continual rumbling in its bowels: after which an aperture was made in its summit, and likewise three others, near the middle of its declivity, at that period buried under prodigious masses of snow. The ignited substances ejected on that occasion, mixed with the vast quantity of snow and ice, melting amidst the flames, were carried down with such amazing rapidity, that, in an instant, the plain from Callao to Latcunga was inundated, the houses of the poor inhabitants were borne down, and great numbers of them perished. The river of Latacunga was the canal of this dreadful flood, till, being too small for receiving the prodigious current, it overflowed the adjacent country, carried away all the buildings within its reach, and rendered the land, near the town of the same name, like a vast lake. The inhabitants retired to a spot of higher ground behind the town, while those parts of it that stood within the limits of the current, were entirely destroyed. During three days the volcano ejected cinders, while torrents of melted ice and snow poured

down its sides. The fire lasted several days longer, and was accompanied with terrible roarings of the wind, rushing through the mouth of the volcano. At last all was quiet, and neither fire nor smoke were to be seen. But, in May 1744, the flames forced a passage through several other parts on the sides of the mountain; so that, in clear nights, the flames, being reflected by the transparent ice, formed a very grand and beautiful illumination. But, on the thirteenth of November following, it ejected such prodigious quantities of fire and ignited substances, that an inundation, equal to the former, soon ensued; and the inhabitants of the town of Latacunga, for some time, gave themselves over for lost.

We are told that there are fiery meteors about these mountains, sometimes so high in the air, as to resemble stars, and sometimes so low, as to frighten the mules, by buzzing about their ears and feet. But a phænomenon, which in this climate must appear very extraordinary, is said by M. Bouguer to happen almost every day on the tops of these mountains; though these gentlemen were the first who ever mentioned them in Europe. The first time our authors observed it, was when they were on the summit of Pambamorea, a mountain not so high as Pichincha. A cloud, in which they were involved at break of day, dissipating, they saw the rising sun extremely splendid, and the cloud passed on the other side, opposite to the sun, where it appeared very thin, and was about twenty yards distant from the place where they were standing, when each of them saw in it, as in a looking-glass, his own image, and, what appeared still more extraordinary, the head was encompassed with a glory, like that seen round the heads of saints in pictures; each head being as it were, the centre of three concentric irises of very lively colours, and each with the same varieties as the rainbow, the red being outward; the last or most external colours of one touched the first of the following; and, at some distance from them all, was a fourth arch, entirely white. These were perpendicular to the horizon; and, as the person moved, the

phænomenon moved also. But, what was very extraordinary, though there were six or seven persons, each could see none but his own shadow, because the cloud had an uneven surface. The diameter of the arches gradually altered with the ascent of the sun above the horizon, and the phænomenon itself, after continuing a considerable time, insensibly vanished. Several of the gentlemen, both French and Spaniards, have particularly described this phænomenon, and M. Bouguer concludes with saying, "This was a kind of apotheosis to each spectator; and I cannot forbear mentioning again, that each enjoyed the secret pleasure of seeing himself adorned with these crowns, without perceiving those of his neighbours. I must, however, observe, that this phænomenon never appears, but when the aqueous particles of the cloud are frozen."

Ulloa observes, that the roads over some of these mountains, are not the least of those many extraordinary particulars relating to them. These are in many places so narrow, that the mules have scarcely room to set their feet, and in others, there is a continued series of precipices. These roads are likewise, full of holes, near three quarters of a yard deep, in which the mules put their fore and hind feet, whence they sometimes draw their bellies and their riders legs, along the ground. These holes indeed serve as steps, without which the precipices would be in a manner impassable; but, should the mule happen to put his feet between two of these holes, or not place them right, the rider falls, and, if on the side of the precipice, inevitably perishes. But the manner of descending appears still more dangerous. On one side are frequently steep eminences, and on the other dreadful abysses; and, as they generally follow the direction of the mountain, the road, instead of being on a level, forms steep eminences and declivities. The mules are sensible of the caution necessary in these descents; for coming to the top of an eminence they stop, and having placed their fore feet close together, put their hinder feet a little forwards, as if going to lie down. Having in this at-

titude taken a survey of the road, they slide down with the swiftnees of a meteor. All the rider has to do is to keep himself fast in the saddle ; for the least motion is sufficient to disorder the equilibrium of the mule, in which case, they both unavoidably perish. Nothing, says our author, can be more amazing than the animal's address on this occasion, for during this rapid motion, when he seems to have lost all government of himself, he follows with the utmost exactness the different windings of the road, as if he had accurately settled in his mind all the turnings he was to follow, and taken every precaution for his safety. Yet the longest practice in travelling these roads cannot entirely free the mules from a kind of dread, which they experience on arriving at the top of a steep declivity; for they not only attentively view the road, but tremble and snort at the danger. If the rider inadvertently endeavour to spur them on, they continue immoveable, till, at length, having overcome the first emotions of their fear, they stretch out their fore legs, that by preserving a proper balance, they may not pitch head forward; and it is wonderful to consider how they make with their body, all the gentle inclinations necessary to enable them to follow the several windings of the road, and afterwards their address in stopping themselves at the end of their impetuous career.

The tediousness and danger of the way, however, is in some parts, alleviated and rendered more tolerable by the fine prospects and agreeable cascades naturally formed among the rocks and mountains. In some parts, the water in the valleys springs up to a great height, like artificial fountains, amongst odoriferous plants and flowers, that yield a delightful prospect. Many of these streams and springs are so exceedingly cold, that a man can scarcely drink them, or hold his hand in them above a minute; but in some places there are hot springs, which leave a green tincture in the channel through which they pass, and are reckoned good against many distempers.

From most of the mountains flow large and rapid

rivers, and we read of a natural bridge of rocks over one of them, from the vault of which hang several pieces of stone resembling icicles, formed as the water drops from the rock, into various shapes, and of different colours. This bridge is broad enough for three or four carts to pass abreast: and there is another bridge near it, laid over by art, (as some say,) between two rocks, but our author, who saw it, thinks it is rather the work of nature. It is so far above the river that he could not hear the stream, though it runs with great rapidity; and, though the river be of a considerable breadth, it appeared like a brook, when he looked down from the bridge, which he could not do without horror.

But, according to Acosta, there is still a greater danger in travelling over some of the mountains of Peru, than any we have yet mentioned. He tells us, that there are mountainous uninhabited deserts, where a sudden blast of air sometimes strikes a traveller dead in an instant; and that the Spaniards formerly passed these mountains in their way to Chili, but now either go by sea, or take another road by land, to avoid the danger of crossing them, in which journey many have perished, and others have lost their fingers and toes, and have been rendered cripples. The same author relates, that general Costilla marching over them with his army, great part of his men suddenly fell down dead, and their bodies remained there without stench or corruption. As incredible as this appears, it seems to be confirmed by the reports of European seamen, who assure us, that they have seen great numbers of bodies of men, women, and children, lying dead upon the sands in Peru, and looking as fresh as if they had not lain there a week; but, when they were handled, they proved as dry and light as a sponge or piece of cork. Whatever was the cause of the death of these people, it is agreed on all hands, that the dryness of the Peruvian air, and the heat of the sands, preserved their bodies from putrefaction.

The audience of Lima enjoys extraordinary advantages in being free from tempest, thunder, lightning,

snow, hail, and rain; but we have already observed, that is subject to earthquakes, which happen so frequently, that the inhabitants are under continual apprehensions of being buried in the ruins of their own houses: yet they are said to have their presages; one of the chief of which is a rumbling noise in the bowels of the earth about a minute before the shocks are felt, and seems to pervade all the adjacent subterraneous parts. This is followed by the howlings of the dogs, who appear sensible of the approaching danger; and the very beasts of burden, passing the streets, are observed to stop, and, by a natural instinct, to spread open their legs, the better to secure themselves from falling. These portents are no sooner observed, than the terrified inhabitants fly from their houses into the streets, with such precipitation, that, if it happens in the night, they appear quite naked, fear and the urgency of the danger banishing all sense of decency. This sudden concourse is accompanied with the cries of children awaked from sleep, mingled with the lamentations of the women, whose agonizing prayers to the saints increase the common fear and confusion; and the men being also too much affected to refrain from giving vent to their terror, the whole city exhibits a dreadful scene of horror and consternation.

THE MINES OF PERU.

The most celebrated mines of Peru are those of Potosi, which have now been opened nearly two hundred and sixty years, and yet continue to be wrought with equal advantage as when first discovered; only with this difference, that the veins, which were then almost on the surface of the mountain, are now sunk to prodigious depths, some of the pits or wells being two hundred fathoms deep, and yet not incommoded with water. What renders the working of the mines exceeding dangerous, are the exhalations arising from them, which are even felt on the outside, and affect

animals that graze in the neigbourhood; but within, they stupefy the miners, none of whom can bear so noxious an air above a day together. Sometimes it is so fatal as to kill on the spot, and oblige them to stop up the veins from whence it exhales. The mines of Potosi are the least subject to these vapours, and yet, without the herb paraguay, the infusion whereof is drank by the miners as we do tea, these mines must soon be abandoned. Some millions of Indians have perished in them, and prodigious numbers continue to be destroyed every year.

The mountain of Potosi, which is famous for the immense quantity of silver it has produced, was first discovered to contain that metal, by a mere accident. An Indian, named Gualca, pursuing some wild goats up this mountain, and coming to a very steep part, laid hold of a shrub, in order to ascend with the greater celerity; but, it being unable to support his weight, came up by the roots, and discovered a mass of fine silver; and at the same time he found some lumps of the same metal among the clods which adhered to the roots. The Indian, who lived at Porco, hasted home, washed the silver, and made use of it, repairing, when his stock was exhausted, to his perpetual fund. At length, an intimate friend, perceiving the happy change in his circumstances, eagerly enquired the cause, and repeated his questions with such earnestness, that Gualca, confiding in his friendship, revealed the secret. For some time they resorted to the mountain for fresh supplies, till Gualca, refusing to discover his method of purifying the metal, the other, in revenge, revealed the whole secret to his master, who went in April 1545, to view this fortunate breach in the mountain; and the mine was instantly worked with immense advantage. The first mine had the name of The Discoverer, from its occasioning the discovery of other sources of wealth enclosed in the bowels of this mountain; for, in a few days, another was found, no less rich, and was named the Tin mine; afterwards another was found, and distinguished by the name of Rica, or Rich, as exceeding all the

rest. At length, another was discovered, which was called the Mendieta. These are the principal mines of this celebrated mountain; but there are several smaller, crossing it in all directions.

The importance of these discoveries induced people to flock to Potosi from all parts, particularly from the city of Plata, which stands about seventy-five miles from the mountain, whence the town of Potosi is at present near six miles in circuit, and inhabited by many noble families, particularly those concerned in the mines. The air at the mountains is indeed so cold as to render all the adjacent country remarkably barren; for it produces neither corn, fruit, nor herbs, and yet the town is so plentifully supplied, as to be in want of nothing, the trade for provisions being greater there than in any other place, Lima excepted. Some provinces send the best of their corn and fruit, others their cattle, others their manufactures; while others resort thither with European goods, as to a sure market. A Spanish author declares on the best authority, that before the year 1638, it appeared by the public accounts that the silver produced by this mountain, amounted to three hundred ninety-five millions six hundred and nineteen thousand dollars; which in ninety-three years, the time it had then been discovered, amounted to forty-one millions two hundred and fifty-five thousand and forty-three dollars per annum. Hence an idea may be formed of the immense trade that has for many years been carried on in this town, which consists entirely of the silver extracted from this mountain, and is still very considerable, though some diminution has been perceived in its produce.

A LAND SHIP.

At Scheveling, a village on the sea-coast, about two miles from the Hague, in the United Provinces, is the model of a land-ship, or sailing-chariot, which was

made for prince Maurice of Nassau, by a celebrated mathematician. In form it resembles a boat, is fixed upon four wheels of equal bigness, has two sails, is steered by a rudder placed between the two hindmost wheels, and is stopped either by letting down the sails, or turning it from the wind. In this machine, the prince and his companions used to divert themselves by sailing along the smooth strand; and it was contrived to move with such ease and swiftness, that a brisk gale would carry eight or ten persons from Scheveling to Petten, (a distance of about fifty English miles,) in three or four hours time; the person at the helm directing its course with very little labour. Bishop Wilkins mentions several great men who have described and admired this curious invention; but we can scarcely credit all that has been reported concerning the swiftness of its motion.

REMARKABLE STONE QUARRY.

In a hill near Maestricht, in the United Provinces, is a remarkable stone quarry, which has one entrance by the side of the Maese, where carts can pass with ease, and unload the stones on the bank of the river. The quarry runs parallel with the horizon, and by the light of torches affords one of the most surprising prospects imaginable; for the walks are spacious and level, and the earth over-head is supported by several thousands of square pillars, most of them twenty feet high, and all wrought with such neatness and regularity as to resemble a subterraneous palace. There is very little rubbish in this qaurry, which is owing to the goodness of the stone, and the carefulness of the workmen; and in several places are little pools of water, which perhaps have been made for beasts to drink, and other uses. When armies march that way, the quarry affords a secure retreat for the country people, who convey thither their horses, cattle, and moveable furniture; and indeed it may well serve for such a

purpose, considering its vast extent; for Mr. Ellis asserts, that it is capable of sheltering a hundred thousand men; but the chillness of the place during his researches, afflicted him with a fit of ague. The stone dug out of this quarry, according to the same gentleman, is much like our Kettering; and the Jesuits have a fine chapel built of it at Maestricht.

INVENTION OF PAPER, AND ITS MANUFACTURE.

When and by whom linen paper was invented, is not known, as Polydore Virgil confesses. Scalinger ascribes the invention to the Germans, Maffei to the Italians, others to some refugee Greeks at Basil, who took the hint from the manner of making cotton-paper in their own country; and Conringius thinks we received it from the Arabs. It appears, however, to have been first introduced amongst us towards the beginning of the fourteenth century, which agrees with the observations of count Maffei, who finds no marks of its use before the year 1300. Some indeed go much farther back, and take the Libri lintei, mentioned by Livy and other Roman writers, to have been written on linen paper; but this notion has been sufficiently refuted. Others make the invention more modern than it really is, dating its origin about three hundred and ninety years ago; but Mabillon proves the contrary from many manuscripts, above four hundred years old, written on linen paper; and Balbinus produces divers instances of such manuscripts written before the year 1340. Add to this, that in the Cottonian library there are writings on paper in the times of most of our kings and queens, as high as the year 1335; and Dr. Prideaux asserts, that he saw a registration of some acts of John Cranden, prior of Ely, made on paper, which bears date in the fourteenth year of king Edward II. that is, A. D. 1320. The invention, according to the learned doctor, seems

to have been brought from the East, most of the old manuscripts in Arabic and other oriental languages being written on this sort of paper, some of which are certainly much older than any of the dates above mentioned. This author thinks it most probable, that the Saracens of Spain first brought it out of the East into that country, from whence it was propagated through the rest of Europe. As to the time of its being introduced into England, we read of a paper-mill erected at Dartford as early as the year 1588, which was probably the first, and is celebrated by Thomas Churchyard, a noted poet of that age, in a poem, entitled, "A Description and Discourse of Paper, and the Benefits it brings; with the setting forth of a Paper-mill built near Dartford, by a High German, called M. Spilman, Jeweller to the Queen."

The linen rags, of which our European paper is made, being carried to the mill, are first sorted, then washed very clean in puncheons, whose sides are grated with strong wires, and the bottoms bored full of holes. After this they are fermented, or laid in square heaps close covered with sacking, till they rot, which is commonly done in four or five days. When duly fermented they are twisted into handfuls, cut small, and thrown into oval mortars made of well-seasoned oak, about half a yard deep, with an iron plate at bottom, an inch thick, eight inches broad, and thirty inches long. In the middle is a washing-block with fine holes in it, and a piece of hair-sive fastened on the inside, so that nothing can pass out, except dirty water. These mortars are continually supplied with water by little troughs from a cistern filled by buckets fastened to the floats of the great wheel, which raises the wooden hammers for pounding the rags in the mortars. When the rags are beaten to a certain degree called the first stuff, the pulp is removed into presses, where it is left to mellow about a week; then it is put into clean mortars, pounded afresh, and removed into presses or boxes as before, in which state it is called the second stuff. The mass being beaten a third time, it resembles flour and water

without any lumps, it is carried to the pit-mortar, where it is perfectly dissolved, and is then taken to the vat to be formed into paper. The vat is rightly primed when the liquor has such a proportion of the pulp, as that the mould dipped into it will take up just enough to make a sheet of paper of the thickness required. The mould is a square sieve about an inch deep, having a brass-wire bottom, resting on sticks to prevent its bagging, and keep it exactly horizontal. This mould the workman dips into the liquor, and gives it a shake as he takes it out to clear the water from the pulp. He then slides it along a grove to the coucher, who turns the sheet, lays it on a felt, and returns the mould to the maker, who, by this time, has prepared a second sheet in another mould; and thus they proceed, laying alternately a sheet and a felt, till they have made six quires of paper, which is called a post. This quantity is then put under a press, and by the strength of four or five men, all the water is pressed from it; after which it is separated from the felts, laid regularly one sheet upon another, and having undergone a second pressing, it is hung up to dry. When sufficiently dried it is taken off the lines, rubbed smooth with the hands, and laid by till sized, which is the next operation. For this they chuse a fine temperate day, and having boiled a proper quantity of clean parchment, or vellum shavings till they come to a size, they prepare a fine cloth, on which they strew a due proportion of white vitriol and rochalum finely powdered, and strain the size through it into a large tub, in which they dip as much paper at once as they can conveniently hold, and with a quick motion give every sheet its share of the size, which must be as hot as the hand can well bear it. After this it is pressed, hung up in sheets to dry, and then being sorted, it is counted into quires, which are folded, pressed very hard, and tied up in reams or bundles for sale.

The method of making marbled paper is extremely curious and interesting. A trough is provided, either made of lead or pitched wood, of the shape and dimensions of the paper to be marbled, and about four

fingers deep, which is to contain the liquor used in the operation. This liquor is made by macerating a quantity of gum tragacanth four or five days in clean water, which is stirred from time to time, and fresh water daily added, till it be of a consistence somewhat thinner than oil, and then it is strained into the trough for use. The colours to be applied on the surface of this liquor, (which are usually blue, red, green, and yellow,) being prepared of proper ingredients, there is added to them a little ox or fish-gall; and if the colours, when sprinkled on the liquor, do not dilate themselves sufficiently, more gall must be added; but if they spread too much, the fault must be corrected by adding more of the colour. The colours being ranged in gallipots on the table where the trough is placed, the workmen begin by dipping a brush of hog's hair into any colour, commonly the blue first, and sprinkling it on the surface of the liquor; then the red is applied in like manner, but with another brush; afterwards the yellow, and lastly the green. When all the colours are thus floating on the liquor, they use a pointed stick, which being drawn from one side of the trough to the other, stirs up the liquor and fluctuating colours; after which they draw a comb over the surface of the liquor, permitting only the teeth to enter; and this being performed with a gentle and uniform motion, makes those clouds and undulations on which the beauty of the paper depends. The colours lying in this posture, the operator applies on them a sheet of white paper, previously moistened, which requires a dexterity that can only be obtained by practice, the surface of the liquor and paper being to meet equally in all parts; which done, before the colours have time to soak through, he lifts it up nimbly, and spreads it on a board, where having lain a while, it is hung upon a line to dry, and is then polished with a marble stone or knob of ivory. It must be observed, that the sprinkling of the colours is to be renewed, and the operations to be performed with the stick and comb, at every application of a fresh

sheet of paper, because each sheet takes off all the colours from the liquor.

THE STADHOUSE OF AMSTERDAM.

The stadthouse of Amsterdam is not only the most magnificent in the United Provinces, but is generally thought to surpass any thing of the kind in Europe. This superb edifice is all of freestone, built upon thirteen thousand six hundred and fifty-nine piles, driven into the ground close to each other; and the first stone was laid on the 28th of October, 1648. It is a square building, two hundred and eighty-two feet in length, two hundred and thirty-five in depth, ninety feet high in front, and one hundred and sixty to the top of the cupola. It has above four hundred windows, and is adorned with a great number of pilasters of the Corinthian order. On the pediment in the centre of the front is an admirable piece of sculpture in relievo, representing the city of Amsterdam under the figure of a woman sitting in a chair, supported by two lions, and holding on her knee the arms of the city. In her hand she has an olive-branch, the emblem of peace; and is attended by sea-nymphs, who present her with crowns of palm and laurel. Here are also represented Neptune and his tritons, with several water-animals; the whole in marble, and the workmanship extremely curious. At each side and on the top of this pediment are placed three brazen statues, representing Justice, Fortitude, and Prudence; and behind it is a handsome dome or cupola, containing a great number of bells, which compose very musical chimes. In this front of the stadthouse are seven doors, or open arches, alluding to the seven provinces of the republic. The back front of the building has also a pediment, with an excellent bass-relief in marble, representing the extensive commerce of Amsterdam, under the emblem of a woman with a winged cap on her head, to whom the four parts of

the world (denoted by proper figures) offer presents of their respective productions. On the sides of the pediment are the statues of Peace and Plenty, and on the top stands a large Atlas with a globe of copper on his shoulders. The inside of this stately fabric is decorated with a profusion of fine paintings, sculptures, and other ornaments. The courts of judicature are lined with marble, and adorned with curious emblematical figures or historical pieces, relating to the distribution of justice; particularly a representation of Solomon passing judgment between the two harlots; and at the entrance of every office or chamber is some sculpture or other appropriate decoration.

A flight of stairs leads to the great hall, at the entrance of which are two strong folding-doors of brass, and several marble columns twenty feet high, supporting a most beautiful cornice. Over this cornice sits the figure of a woman bearing on her breast the city arms, while an eagle places on her head an imperial crown. At her feet are two lions; on one side is a statue of Fortitude, and that of Minerva on the other; and four naked children hover round her with cornucopias, pouring out fruits and flowers. The beauty and magnificence of this hall are hardly to be described; the stately marble pillars, the representation of the four elements at the corners, the exquisite paintings, statues, and other ornaments, at once surprise and charm the spectator: but the greatest curiosity is the marble floor, on which the celestial and terrestrial globes are represented in planisphere; the constellations in the one, and the several parts of the earth in the other, with the principal circles, being all delineated in brass neatly laid into marble, and the names of the countries expressed in a similar manner. Each hemisphere is about twenty-two feet in diameter, and the whole is universally admired as a most ingenious performance. This structure cost three millions of guilders, or 300,000l. sterling, when money was much more valuable than it is at present.

THE PARROT.

Parrots are natives chiefly of tropical regions, where they live, for the most part, on fruit and seeds. They are gregarious, and excessively noisy and clamorous; yet, though they associate in vast multitudes, they live chiefly in pairs of one male and a female. The place they hold among the birds seems to be exactly that which the apes and monkeys occupy among the quadrupeds; for, like these, they are very numerous, imitative, and mischievous.

In a domestic state they are exceedingly docile, and very imitative of sounds; most of the species being able to counterfeit even the human voice, and to articulate words with great distinctness: but their natural voice is a loud, harsh, and unpleasant scream. Alexander the Great is supposed to have been the first who introduced parrots into Europe.

The common ash-coloured parrot is the well-known species which is now most commonly brought into Europe. It is superior to most others, both in the facility, and the eagerness with which it imitates the human voice: it listens with attention, and strives to repeat; it dwells constantly on some syllables which it has heard, and seeks to surpass every voice by the loudness of its own.

A parrot which Colonel O'Kelly bought for a hundred guineas at Bristol, not only repeated a great number of sentences, but answered many questions: it was also able to whistle many tunes. It beat time with all the appearance of science; and so accurate was its judgment, that, if by chance it mistook a note, it would revert to the bar where the mistake was made, correct itself, and, still beating regular time, go through the whole with wonderful exactness. Its death was thus announced in the General Evening Post for the 9th of October, 1802: "A few days ago died, in Half-moon-street, Piccadilly, the celebrated parrot of Colonel O'Kelly. This singular bird sang a number of songs in perfect time and tune.

She could express her wants articulately, and give her orders in a manner approaching nearly to rationality. Her age was not known; it was, however, more than thirty years, for previously to that period, Colonel O'Kelly bought her at Bristol for a hundred guineas. The Colonel was repeatedly offered five hundred guineas a-year for the bird, by persons who wished to make a public exhibition of her; but this, out of tenderness to the favourite, he constantly refused. The bird was dissected by Dr. Kennedy and Mr. Brcokes; and the muscles of the larynx, which regulate the voice, were found, from the effect of practice, to be uncommonly strong."

Dr. Goldsmith relates that a parrot, belonging to king Henry VII., having been kept in a room next the Thames, in his palace at Westminster, had learned to repeat many sentences from the boatmen and passengers. One day, sporting on its perch, it unluckily fell into the water. The bird had no sooner discovered its situation, then it called out aloud, "A boat! twenty pounds for a boat!" A waterman, happening to be near the place where the parrot was floating, immediately took it up, and restored it to the king; demanding, as the bird was a favourite, that he should be paid the reward that it had called out. This was refused; but it was agreed that, as the parrot had offered a reward, the man should again refer to its determination for the sum he was to receive—"Give the knave a groat," the bird screamed aloud, the instant the reference was made.

Mr. Locke, in his Essay on the Human Understanding, relates the following anecdote concerning a parrot: During the government of Prince Maurice in Brasil, he had heard of an old parrot that was much celebrated for answering, like a rational creature, many of the common questions that were put to it. The curiosity of the prince was roused, and he directed it to be sent for. When it was introduced into the room where the prince was sitting in company with several Dutchmen, it immediately exclaimed, in the Brasilian language, "What a company of white men are here!"

They asked, "Who is that man?" (pointing to the prince:) the parrot answered, "Some general or other." When the attendants carried it up to him, he asked through the medium of an interpreter, "From what place do you come?" The parrot answered, "From Marignan." The prince asked, "To whom do you belong?" It answered, "To a Portuguese." He asked again, "What do you do there?" It answered, "I look after chickens!" The parrot in continuation said, "Yes, I; and I know well enough how to do it;" clucking at the same time, in imitation of the noise made by the hen to call together her young ones.

Madam Nadault, sister to Buffon, had a parrot, which often spoke to his paw, and answered by holding it up. He loved the voice of children, yet hated themselves, pursued and bit them till he drew blood. He had also his objects of attachment; and though his choice was not very nice, it was constant. He was very fond of the cook-maid, followed and sought her, and seldom missed finding her. If she had been some time out of his sight, the bird climbed with his bill and claws to her shoulders, lavished his caresses, and would on no account quit her; his fondness had all the marks of close and warm friendship. The girl happened to have a very sore finger, which was tedious in healing, and so painful as to make her scream; while she uttered her moans the parrot never left her chamber. The first thing he did every day, was to pay her a visit; and this tender condolence continued the whole time of the cure, when he returned to his calm settled attachment. Yet this strong predilection seems to have been more to the office of the girl in the kitchen, than to her person; for, when another cook-maid succeeded her, the parrot shewed the same fondness the very first day.

FOUNTAIN TREES.

The fountain trees are very extraordinary vegetables, growing in one of the Canary Islands, and likewise said to exist in some other places. Of these remarkable trees we have the following account in Glasse's History of the Canary Islands. "There are only three fountains of water in the whole island of Hiero, where the fountain tree grows. The great cattle are watered at those fountains, and at a place where water distils from the leaves of a tree. Many writers have made mention of this famous tree, some in such a manner as to make it appear miraculous; others again positively deny its existence; among whom is Feyjoo, a modern Spanish critic. But he and those who agree with him in this matter, are as much mistaken as those who would make it appear miraculous.

"The author of the 'History of the Discovery and Conquest of the Canaries,' has given a particular account of this remarkable vegetable, which I shall here insert at large:—The district in which this tree stands, is called *Tigulahe;* near to which, and in the steep rocky ascent that surrounds the whole island, there is a narrow gutter, commencing at the sea, and continuing to the summit of the cliff, where it is joined with a valley that is terminated by the steep front of a rock. On the top of this rock grows a tree, called, in the language of the ancient inhabitants, *garse*, or 'sacred tree,' which for many years has been preserved sound, fresh, and entire. Its leaves constantly distil such a quantity of water, as is sufficient to furnish drink to every living creature in Hiero; nature having provided this remedy for the drought of the island. Nobody knows of what species this tree is, only that it is called *till*, and stands by itself at the distance of a league and a half from the sea. The circumference is about twelve spans, the diameter four, and its height from the ground to the top of the highest branch forty spans. The branches are thick and extended; the lowest com-

mence about an ell from the ground; and the circumference of the whole of them is about a hundred and twenty feet. The fruit resembles an acorn, and tastes somewhat like the kernel of a pine-apple, but is softer and more aromatic. The leaves appear like those of the laurel, but are larger, wider, and more curved: they come forth in a perpetual succession, so that the tree always remains green.

"On the north side of this tree are two large tanks, or cisterns, of rough stone; or rather one cistern divided, each half being twenty feet square, and sixteen spans in breadth. One of these contains water for the drinking of the inhabitants; and the other that which they use for their cattle, and domestic purposes.

"Every morning, near this part of the island, a cloud or mist, rises from the sea, which the south and east winds force against the above-mentioned steep cliff; so that the cloud having no vent but by the gutter, gradually ascends it, and from thence advances slowly to the extremity of the valley, where it is checked by the front of the rock which terminates the valley. It then rests upon the thick leaves and wide-spreading branches of the tree, from whence it distils in drops during the remainder of the day until it is at length exhausted; in the same manner that we see water drip from the leaves of trees after a heavy shower of rain. This distillation is not peculiar to the *garse* or *till*, for some bresos which grow near it also drop water; but their leaves being few and narrow, the quantity is so trifling, that though the natives catch some of it, yet they make little account of any but what distils from the garse; which, together with the water of some fountains, and what is saved in the winter season, is sufficient to serve them and their flocks. The tree yields most water in those years when the easterly winds have prevailed for a continuance; for, by these winds only the clouds, or mists, are drawn hither from the sea.

"A person lives on the spot near which this curious tree grows, who is appointed to take care of it and its water, and is allowed a house to live in, together with

a certain salary. He every day distributes to each family in the district, seven pots of water, besides what he gives to the principal people of the island."

Whether the tree which yields water at the present time, be the same as that mentioned in the above description, we cannot determine; but it is probable there has been a succession of them: for Pliny describing the Fortunate Islands, says, "In the mountains of Ambrion are trees resembling the plant ferula, from which water may be procured by pressure. What comes from the black kind is bitter, but that which the white yields is sweet and potable."

"Trees yielding water, however, are not peculiar to the island of Hiero; for travellers inform us of one of the same kind on the island of St. Thomas, in the gulph of Guinea; and in "Cockburn's Voyages," we find the following account of a dropping tree, near the mountains of Fera Paz, in America:—

"On the morning of the fourth day, we came out on a large plain, in the middle of which stood a tree of unusual size, spreading its branches over a vast compass of ground. Curiosity led us up to it. We had perceived, at some distance, the ground about it to be wet, at which we were rather surprised, as well knowing there had no rain fallen for near six months past, according to the certain course of the season in that latitude; and that it was impossible to be occasioned by a fall of dew, we were convinced by the sun's having power to exhale all moisture of that nature a few minutes after its rising. At length to our great amazement, we saw water dropping, or as it were distilling, pretty fast from the end of every leaf of this tree, which might not improperly be termed *miraculous;* at least it was so with respect to us, who had been labouring four days through extreme heat without receiving the least moisture, and were now almost expiring for want of it. We could not help looking on this as water sent from heaven to comfort us under great extremity, and, having caught what we could of it in our hands, we liked it so well, that we could hardly prevail with ourselves to give over drinking.

"A matter of this nature could not but incite us to make the strictest observations concerning it; and, accordingly, we staid under the tree about three hours, and found that we could not fathom its body in five times. We observed the soil where it grew to be very strong; and, upon the nicest enquiry we could afterwards make, both of the natives of the country and the Spanish inhabitants, we could not learn that there was any tree of a similar nature throughout New Spain, nor perhaps all America over. I do not, however, relate this as a prodigy in nature; because, though I am not philosopher enough to ascribe any natural cause for it, the learned may perhaps be able to give substantial reasons, for what appeared to us a great and marvellous secret."

REMARKABLE INSTANCES OF ABSTINENCE.

Martha Taylor, born in Derbyshire, having received a violent blow on her back, is said to have fallen into such a state, that she took little sustenance but some drops with a feather for thirteen months, and slept very little too all the time. S. Chilton, of Tinsbury, near Bath, often slept for several weeks together; which case being very extraordinary, we hope an extract of it from the Philosophical Transactions will not be unacceptable to the reader. This Chilton was a labouring man, about twenty-five years of age, not fat but fleshy, and on the 13th of May, 1694, without any visible cause, fell into a profound sleep, out of which he could by no means be roused by those about him, but after a month's time he rose of himself, put on his clothes, and went about his business of husbandry as usual. From this time till about the 9th of April, 1696, he remained free from any extraordinary drowsiness, but then fell into his sleeping fit again. After some days his friends were prevailed on to try what remedies might effect; and accordingly an apothecary bled, blistered, cupped, and scarified him,

and used all the external irritating medicines he could think of, but all to no purpose. Victuals stood by him (as before) which he ate now and then, but nobody ever saw him eat though sometimes they found him with his mouth full of meat. In this manner he lay till the 7th of August, which was seventeen weeks from the time when he began to sleep; and then he awaked, put on his clothes, and walked about the room, not knowing he had slept so long, till, going into the fields, he found people busy in getting in their harvest, and he remembered that, when he fell asleep, they were sowing their oats and barley.

From this time he remained well till the 17th of August, 1697, when he complained of a shivering and a coldness in his back, vomited once or twice, and the same day fell fast asleep again. Dr. Oliver (from whom this account is taken) went to see him, and felt his pulse, which was then very regular; he was in a breathing perspiration, and had an agreeable warmth all over his body. The doctor then put his mouth to his ear, and called him as loud as he could several times by his name, pulled him by the shoulders, pinched his nose, stopped his mouth and nose together, but to no purpose, the man not giving the least sign of being sensible. Upon this he held a phial with spirit of sal armoniac under one of his nostrils, and injected about half an ounce of it up the same nostril, but it only made his nose run, and his eye-lids tremble a little. Finding no success this way, the doctor crammed that nostril with powder of white hellebore, and waited some time to see what effect it would produce, but the man did not discover the least uneasiness. The doctor then left him, fully satisfied that he was really asleep, and no sullen counterfeit, as some people supposed.

About ten days after, an apothecary took fourteen ounces of blood from the man's arm, tied it again, and left him as he found him, without his making the least motion all the while. The latter end of September, Dr. Oliver saw him again, and a gentleman ran a large pin into his arm to the very bone, but he gave no signs

of being sensible what was done to him. In this manner he lay till the 19th of November, when his mother, hearing him make a noise, ran immediately up to him, and found him eating. She asked him how he did? Very well, he said, thank God: And again she asked him, which he liked best, bread and butter, or bread and cheese? He answered, bread and cheese: whereupon the woman overjoyed, ran down to acquaint his brother with it, and, both coming up again presently, they found him as fast asleep as ever. Thus he continued till the end of January or beginning of February, at which time he awaked perfectly well, remembering nothing that had happened all the while. It was observed, that he was very little altered in his flesh, only he complained the cold pinched him more than usual, and so went about his business as at other times.

Numerous other instances of extraordinary abstinence, particularly from morbid causes, are to be found in the different periodical Memoirs, Transactions, &c. We may add, that in most instances of extraordinary abstinence, related by naturalists, there have been apparent marks of a texture of blood and humour, much like that of the tortoise, and some other animals, though it is not improbable that the air itself may furnish something for nutrition. It is certain there are substances of all kinds, animal, vegetable, &c. floating in the atmosphere, which must be continually taken in by respiration. And that an animal body may be nourished thereby, is evident from the instance of vipers, which, if taken when first brought forth, and kept from every thing but air, will yet grow very considerably in a few days. The eggs of lizards, also, are observed to increase in bulk after they are produced, though there be nothing to furnish the increment but air alone; in like manner, as the eggs or spawn of fish grow and are nourished by the water.

THE ORANG OUTANG.

One of the most remarkable animals of the monkey species is, the orang outang, or wild man of the woods, which sometimes grows to the height of six feet, and is possessed of prodigious strength, insomuch that they have been known to seize a defenceless woman and carry her off, in spite of all her exertions. They will also frequently drive away the elephants, and throw stones at any person who presumes to offend them.

The face and ears of this animal bear a striking resemblance to those of man, and the hair on the head is much longer than that on the body. The face and paws are swarthy, and the body and limbs covered with reddish shaggy hair, which is pretty long on the back, but thinner on the fore parts. They commonly walk erect, and are remarkably agile in their motions; but they are of a grave appearance and melancholy disposition.

An orang outang seen by Buffon, is described by that naturalist as mild, affectionate, and good natured. His air was melancholy, his movements measured, and his dispositions gentle. He had neither the impatience of the Barbary ape, the maliciousness of the baboon, nor the extravagance of the monkey. "I have seen this animal," says our author, "present his hand, to conduct the people who came to visit him, and walk as gravely along with them as if he had formed a part of the company. I have also seen him sit down at table, unfold his napkin, wipe his lips, use a spoon or fork in eating, pour his liquor into a glass, and make it touch that of the person who drank along with him. When invited to take tea, he would bring a cup and saucer, place them on the table, put in sugar, pour out the tea, and let it cool before he attempted to drink it. All these actions he performed without any other instigation than the signs or commands of his master, and very often of his own accord. He was perfectly harmless, and approached company with circumspection when he wished to be caressed."

He is said to have eaten almost every thing, but preferred fruit and sweetmeats to all other kinds of food. He drank a little wine, but was always willing to leave it for milk, tea, or other mild liquors. This animal, which was a young one, and measured about two feet four inches in height, lived one summer in Paris and died at London in the winter following. As his breast was diseased and he was afflicted with a teazing cough, it is probable that the quantity of dainties with which he was indulged, contributed to shorten the period of his existence.

To enable our readers to form an accurate judgment of this curious animal which has so great a resemblance to man, we shall quote from Buffon the most remarkable differences and conformities which make him approach, or recede from the human species. "He differs from man externally (says our author) by the shortness of his front, the flatness of his nose, and by his chin, which is not elevated at the base. His ears are proportionably too large, his eyes too near each other, and the distance between his nose and mouth is too great. These are the only differences between the human face and that of the orang outang: but with respect to the members, the thighs are proportionably too short, the arms too long, the fingers too small, the palm of the hand too narrow, and the feet rather resemble hands than the human foot.

"The orang outang differs internally from the human species in the number of ribs, for he has thirteen, whereas man has only twelve. The vertebræ of the neck are also shorter, the buttocks flatter, and the orbits of the eyes sunk deeper. The kidneys, likewise, are rounder than those of man, and the ureters have a different figure, as well as the bladder and gall-bladder, which are longer and narrower than in the human subject. All the other parts of the body, head, and members, both external and internal, bear so near a resemblance to those of man, that we cannot make the comparison without being astonished that such a similarity in structure and organization should not produce the same effects. The tongue and all the organs

of speech, for example, are exactly the same as in man, and yet the orang outang enjoys not the faculty of speaking; the brain has the same figure and proportion, and yet he possesses not the power of thinking. Can there be a more evident proof, therefore, than is exhibited in this creature, that matter alone, though perfectly organized, can produce neither thought nor language, unless it be animated by a superior principle?

"The orang outang has certainly a greater resemblance to man than even to the baboons or monkeys, not only in all the parts abovementioned, but in the largeness of the face, the figure of the jaws, teeth, and bones of the head; the thickness of the finger and thumb; the formation of the nails, &c. In short, if there were a scale by which we could descend from human nature to that of the brutes, and if the essence of this nature consisted entirely in the form and organization of the body, the orang outang would approach nearer to man than any other animal.—Placed in the second rank of beings, he would make the other animals feel his superiority, and oblige them to obey him; and if the principle of imitation were a result of thought, this ape would be still farther removed from the brutes, and have a greater affinity to man. But the interval which separates them is immense. Mind, reflection, and language depend not on the figure or organization of a body, but are endowments peculiar to man. Though the orang outang has a body, members, a brain, and a tongue perfectly similar to those of man, he neither speaks nor thinks. Though he counterfeits every human movement, he performs no action that is characteristic of man, no action that has the same principle or the same design."

THE CHIMPANZEE, OR PIGMY.

Having described the orang outang, which approaches nearly to the human race, in its stature

manner of walking, shape, and sagacity, we shall now notice the chimpanzee, or pigmy, which seems nearly of the same species in every thing but its size. In the year 1738, (if we are rightly informed) captain Flower brought over a female pigmy from Angola, which was two feet four inches high, had a face like a man, and was tolerably fair, except on the chin, where a few straggling hairs appeared. Its nose was small and like that of an ape, its mouth about two inches and a half wide, and its teeth shaped like human teeth, but neither very white nor sound. The hair on its head was an inch or more in length, and its back parts were pretty hairy; but on its breast and belly the hair was much thinner. Its feet were entirely bare on the inside, as were also the hands both on the inside and outside.

This creature walked erect, was extremely fond of persons it was used to, and even knew how to behave with good manners at the tea-table. It would fetch its little chair, and sit down as naturally as any of the company; and if the tea were too hot, would pour it into the saucer to cool; with many other seemingly rational actions, which were equally diverting and surprising to the spectators. Its food was chiefly potatoes, bread, milk, nuts, apples, and raw onions, which last it greedily devoured, showing an aversion to all kinds of flesh, except now and then a bit of rabbit or chicken. It lived in England about six months, and being opened after its death, it was found to have died of a confirmed jaundice.

The chimpanzee, dissected many years ago by Dr. Tyson, was also brought from Angola, and measured twenty-six inches from the top of the head to the heel. The thickest part of its body was sixteen inches round, and the length of the arm was seventeen inches from the shoulder to the end of the fingers. The face of this creature more nearly resembled that of a man, than the face of an ape or a monkey does; and its head was as big as either of theirs; but the nose was much alike in both. The ears, for size, colour, and structure, were entirely like those of a man, but it had

no eye-brows, though hair grew on the eye-lids. Its breast was small, and not protuberant; but the two nipples, which were very apparent, were exactly situated as in the human species. It had hair in the armpits; and, all behind, from the head downwards, the hair was so thick, as almost to prevent the skin from being seen; but, in all parts before, it was much thinner. The navel of the chimpanzee is very visible in the exact place, and is in all respects the same as in man: but the palms of its hands, and the soles of its feet, are always of an equal length, and longer in proportion than those of men. Its toes are as long as its fingers, the middlemost toe being longer than the rest; and the great toe, like the thumb, is set off at a distance from the others.

Several authors have said, that, in the sea of Angola, and in many other places, is a fish eight spans in length, with the head oval, and the face somewhat resembling that of a man. It is said to have a high forehead, small eyes, a flat nose, and large mouth; but it has neither chin nor ears. It has two arms, which are short, and without elbows, with hands or paws, to each of which are four long fingers, which are not very flexible, connected by a membrane like that of the foot of a goose. Their sex is distinguishable by the parts of generation. The females have breasts to suckle their offspring, the upper part of their body resembling that of the human species, and the lower part that of a fish. Their skin is of a brownish-grey colour, and their intestines resemble those of a hog. Their flesh is as fat as pork, particularly that of the upper parts of their bodies; and this is a favourite dish with the natives on shore, who broil it. This kind of sea-ape makes a lamentable cry, when drawn out of the water. We are told there is a bone in the head that divides the brain, which the Portuguese powder, and say it is of great service in the stone and gravel. Accounts of the catching of these animals in Europe, are related by Wormius, Guicciardino, Mexia, Scybold, Erasmus, Franciscus, and others.

THE TAR LAKE.

THERE is a curious bituminous lake in the island of Trinidad, of which Mr. Anderson has given the following interesting account in the seventy-ninth volume of the Philosophical Transactions.

"A most remarkable production of nature in the island of Trinidad, is a bituminous lake, or plain, known by the name of *Tar Lake*; by the French called *La Bray*, from its resemblance to, and answering the intention of ship pitch. It lies in the leeward side of the island, about half way from the Bocas to the south end, where the mangrove swamps are interrupted by sand-banks and hills; and on a point of land which extends into the sea about two miles, exactly opposite to the high mountains of Paria on the north side of the gulf.

"This cape, or headland, is about fifty feet above the level of the sea, and is the greatest elevation of land on this side of the island. From the sea it appears a mass of black vitrified rocks; but on a close examination, it is found to be a composition of bituminous scoriæ, vitrified sand, and earth, cemented together: in some parts, beds of cinders only are found. In approaching this cape, there is a strong sulphureous smell, sometimes disagreeable. This smell is prevalent in many parts of the ground, to the distance of eight or ten miles.

"This point of land is about two miles broad, and on the east and west sides, from the distance of about half a mile from the sea, falls with a gentle declivity to it, and is joined to the main land on the south by the continuation of the mangrove swamps; so that the bituminous plain is on the highest part of it, and only separated from the sea by a margin of wood which surrounds it, and prevents a distant prospect of it. Its situation is similar to a savannah, and like that, it is not seen till treading upon its verge. Its colour and even surface present at first the aspect of a lake of water; but it is possible it got the appellation of *Lake*

when seen in the hot and dry weather, at which time its surface, to the depth of an inch, is liquid; and then from its cohesive quality it cannot be walked upon.

"It is of a circular form, about three miles in circumference. At my first approach it appeared a plain, as smooth as grass, excepting some small clumps of shrubs and dwarf trees that had taken possession of some spots of it; but when I had proceeded some yards, I found it divided into areolæ of different sizes and shapes: the chasms or divisions anastomosed through every part of it; the surface of the areolæ perfectly smooth and horizontal; the margins undulated; each undulation enlarged to the bottom till they join the opposite. On the surface, the margin or first undulation is distant from the opposite from four to six feet, and the same depth before they coalesce; but where the angles of the areolæ oppose, the chasms or ramifications are wider and deeper. When I was at it, all these chasms were full of water, the whole forming one true horizontal plane, which rendered my investigation of it difficult and tedious, being necessitated to plunge into the water a great depth in passing from one areolæ to another. The most accurate idea that can be formed of its surface, will be from the areolæ and their ramifications on the back of a turtle. Its common consistence and appearance is that of pit-coal, the colour rather greyer. It breaks into small fragments of a glossy and cellular appearance, with a number of minute and shining particles interspersed through its substance: it is very friable, and when liquid, is of a jet black colour. Some parts of the surface are covered with a thin and brittle scoria, a little elevated. As to its depth I can form no idea of it; for in no part could I find a substratum of any other substance: in some parts, however, I found calcined earth mixed with it.

"Although I smelt sulphur very strong on passing over many parts of this plain, I could discover no appearance of it, nor any rent or crack through which the steams might issue; probably it was from some part of the adjacent woods; for although sulphur is

the basis of this bituminous matter, yet the smells are very different and easily distinguished, for its smell comes the nearest to that of pitch of any thing I know. I could make no impression on its surface without an axe; but at the depth of a foot I found it a little softer, with an oily appearance in small shells. A little of it held to a burning candle makes a hissing or crackling noise like nitre, emitting small sparks with a vivid flame, which extinguish the moment the candle is removed. A piece put in the fire will boil up a long time without suffering much diminution; and after a long time's severe heat, the surface will burn, and form a thin scoria, under which the rest remains liquid. Heat seems not to render it fluid, nor to occupy a larger space than when cold; from which I imagine there is but little alteration on it during the dry months, as the solar rays cannot exert their force above an inch below the surface. I was told by one person, that in the dry season the whole was an uniform smooth mass; and by another that the ravins contained water fit for use during the year. But neither of these assertions can I believe; for if, according to the first, it were an homogeneous mass, something more than an external cause must affect it to give it the present appearances; nor without some hidden cause can the second be granted. Although the bottoms of these ramified channels admit not of absorption, yet from their open exposure, and the black surface of the circumjacent parts, evaporation must go on amazingly quick, and a short time of dry weather must soon empty them; nor from the situation and structure of the place is there a possibility of supply but from the clouds. To show that the progress of evaporation is inconceivably quick here, at the time I visited it, there were, on an average, two-thirds of the time incessant torrents of rain; but from the afternoon being dry, with a gentle breeze, (as is generally the case during the rainy season in this island), there evidently was an equilibrium between the rain and the evaporation; for in the course of three days I saw it twice, and perceived no alteration on the

height of the water, nor any outlet for it but by evaporation.

"I take this bituminous substance to be the *bitumen asphaltum* of Linneus. A gentle heat renders it ductile: hence, mixed with a little grease or common pitch, it is much used for the bottoms of ships, for which intention it is collected by many; and I should conceive it a preservative against the borer, so destructive to ships in this part of the world.

"Besides this place, where it is found in a solid state, it is found liquid in many parts of the woods, and at the distance of twenty miles from this, about two inches thick, in round holes of three or four inches diameter, and often in cracks or rents. This is consequently liquid, and smells stronger of tar than when indurated, and adheres strongly to any thing it touches: grease is the only thing that will divest the hands of it.

"The soil in general, for some distance round La Bray, consists of cinders and burnt earths; and where not so, it is a strong argillaceous soil; the whole exceedingly fertile, which is always the case where there are any sulphureous particles in it. Every part of the country, to the distance of thirty miles round, has every appearance of being formed by convulsions of nature from subterraneous fires. In several parts of the woods are hot springs; some I tried with a well-graduated thermometer of Fahrenheit, were twenty and twenty-two degrees hotter than the atmosphere at the time of trial. From its position to them, this part of the island has certainly experienced the effects of the volcanic eruptions, which have heaped up those prodigious masses of mountains that terminate the province of Paria on the north; and no doubt there has been, and still probably is, a communication between them.—One of these mountains, opposite to La Bray, in Trinidad, has every appearance of a volcanic mountain: however, the volcanic effects have been very weak here, as no traces of them extend above two miles from the sea in this part of the island, and

the greater part of it has had its origin from a very different cause to that of volcanoes; but they have certainly laid the foundation of it, as is evident from the high ridge of mountains which surrounds its windward side, to protect it from the depredations of the ocean, and is its only barrier against that overpowering element, and may properly be called the skeleton of the island.

"From every examination I have made, I find the whole island formed of an argillaceous earth, either in its primitive state, or under its different metamorphoses. The bases of the mountains are composed of *schistus argillaceous*, and *talcum lithormargo;* but the plains or lowlands remaining nearly in the same moist state as at its formation, the component particles have not experienced the vicissitudes of nature so much as the more elevated parts, consequently retain more of their primitive forms and properties. As argillaceous earth is formed from the sediment of the ocean, from the situation of Trinidad to the continent, its formation is easily accounted for, granting first the formation of the ridge of mountains that bounds its windward side, and the high mountains on the continent that nearly join it: for the great influx of currents into the gulf of Paria, from the coasts of Brasil and Andalusia, must bring a vast quantity of light earthy particles from the mouth of the numerous large rivers which traverse these parts of the continent: but the currents being repelled by these ridges of mountains, eddies and smooth water will be produced where they meet and oppose, and therefore the earthy particles would subside and form banks of mud, and, by fresh accumulations, would soon form dry land: and from these causes it is evident such a tract of country as Trinidad must be formed. But these causes still exist, and the effect from them is evident; for the island is daily growing on the leeward side, as may be seen from the mud-beds that extend a great way into the gulf, and these constantly increase. But from the great influx from the ocean at the south end of the island, and its

egress to the Atlantic again, through the Bocas, a channel must ever exist between the continent and Trinidad."

FUNERALS OF THE HINDOOS.

With respect to the funerals of the Hindoos, some of them bury the body, and others burn it. Mr. Grose saw both these ceremonies performed, at Bombay. The first he mentions was one who buried his wife, a young woman of about twenty years of age. Those who accompanied the husband, dug a pit in the form of a well; on one side of which was a niche for the corpse to be placed in a sitting posture, with room sufficient for a plate of raw rice, and a jar of water by her side. The pit was no sooner ready, than she was put into it, with all her clothes and jewels, exactly as she wore them when alive; but she was no sooner placed, than her husband, who stood by, jumped into the grave, and very composedly took off all her jewels, and brought them up with him; after which the pit was filled up.

The ceremony of burning is performed in the following manner: Having washed and dressed the corpse, the relations and friends carry it on a bier to a small distance from the town. This is usually done the next day; and if a person died in the morning, his body is sometimes burnt the same evening; for, in these hot countries, a corpse will not keep long. The funeral pile is usually prepared near some river or pond, and, if he be a person of wealth, great quantities of fragrant wood are mixed with the fuel. Mr. Grose was present at burning the corpse of a youth of about eighteen years of age, the son of a Banian. The funeral pile was prepared on the beach, the father assisting at it bare-headed, and dressed in such coarse tattered garments as are usually worn on such mournful occasions. As soon as the corpse is placed on the pile, and some prayers muttered by the attending Brahmin, fire is set

to it at one of the corners, when it soon blazes up and consumes the body to ashes, without any noisome smell. What particularly excited our author's attention, was the behaviour of the father, who, according to the Hindoo custom, of its being always the next and dearest relation that sets fire to the pile, walked thrice round it, with a sort of desperate haste, and then, with his face averted, thrust his hand behind him, and set fire to it; after which, he rolled himself in the sand, and smote upon his aged breast with the appearance of extreme agony.

The cruel custom of the women publicly burning themselves, at the death of their husbands, is still practised in some places, though both the Moguls and English have endeavoured to abolish it. Mandeslo, a traveller of undoubted veracity, gives the following description of one of these funeral rites at which he was present:

"A young woman, twenty years of age, having been informed that her spouse died at two hundred leagues distance, resolved to celebrate his obsequies by burning herself alive. In vain was it represented to her, that the news was uncertain; nothing was capable of making her change the resolution she had taken. We saw her arrive at the place of her suffering with such extraordinary gaiety and confidence, that I was persuaded she had stupified her senses with opium. At the head of the retinue which accompanied her, was a band of the country music, consisting of hautboys and kettle-drums. After that came several virgins and married women, singing and dancing before the widow, who was dressed in her richest clothes, and whose neck, fingers, arms, and legs, were loaded with a profusion of jewels and bracelets. A troop of men, women, and children followed, and closed the procession. She had previously washed herself in the river, that she might join her husband without any defilement. The funeral pile was made of apricot-wood, mixed with branches of sandal and cinnamon. She beheld it afar off with contempt, and approached it with apparent composure: she took leave of her friends and relations,

and distributed her ornaments amongst them. I kept myself near her on horse-back, along with two English merchants. Judging, perhaps, by my countenance, that I was sorry for her, to comfort me she threw me one of her bracelets, which I luckily caught hold of. When she was seated on the top of the pile, the attendants set fire to it, and she poured on her head a vessel of fragrant oil, which the flame immediately seized on: thus she was stifled in a moment, without being observed to alter her countenance. Some of the assistants threw in several cruses of oil to increase the fire, and filled the air with frightful cries. When she was entirely consumed, her ashes were thrown into the river."

It has been said, that this inhuman custom was introduced by the Hindoos, to put a stop to the cruelty of the wives, who frequently poisoned their husbands; but Mr. Grose observes, that their minds are generally too soft and tender, to incur even the suspicion of their being inclined to such acts of cruelty; and he adds, that their superstition and extreme fondness for their husbands is the sole cause. "This," says he, "is owing to their early marriage, after which the parties, in the tenderness of the ductile age of childhood, are brought up, till that of consummation, in the constant inculcation of mutual tenderness, as a sacred point of religion; and the women, especially, retain such strong impressions of this doctrine, that numbers of them readily embrace the cruel practice of burning themselves with their husbands. Some of them, living under governments where this barbarous act of superstition was not suffered, have voluntarily gone to Hindoo countries, merely to enjoy the liberty of performing it. It must not, however, be understood, that this practice of voluntarily burning is very general, many of the lower tribes being entirely exempted from it; and it is only with respect to the more considerable personages, that it is ever used.

THE MINES OF DALMORA.

"THE mines of Dalmora, in Sweden," says a modern traveller, "are celebrated for producing the finest iron ore in Europe. It is not dug as in the mines of tin and coal in England, but torn up by powder. The operation is performed every day at noon, and is one of the most tremendous and awful it is possible to conceive. We arrived at the mouth of the great mine, which is nearly half an English mile in circumference, in time to be present at it. Soon after twelve o'clock, the first explosion began, which I cannot compare to any thing so aptly as subterraneous thunder, or volleys of artillery discharged under ground, and the concussion was so violent as to shake the surrounding earth on every side.

"As soon as the explosions were finished, I determined to descend into the mine, though there was no way to do this but in a large deep bucket, fastened by chains to a rope. The inspector, at whose house I had slept the preceding night, took no little pains to dissuade me from the resolution, and pointed out the melancholy accidents that sometimes happened on such occasions. Finding, however, that I was deaf to all his remonstrances, he provided a clean bucket, and put two men in to accompany me.—I am not ashamed to own, that when I found myself suspended between heaven and earth by a rope, and looked down into the deep and dark abyss before me, to which I could see no termination, I shuddered with apprehension, and half repented my curiosity. This, however, was only a momentary sensation, and before I had descended one hundred feet, I looked round on the scene with tolerable composure. I was near nine minutes before I reached the bottom, it being eighty fathoms, or four hundred and eighty feet deep. The view of the mine, when I set my foot on the earth, was awful and sublime in the highest degree: whether terror or pleasure formed the predominant feeling as I looked at it, is hard to say. The light of the day

was very faintly admitted into these subterraneous caverns, in many places it was absolutely lost, and flambeau supplied its place; I saw beams of wood across from one side of the rock to another, where the miners sat employed in boring holes for the admission of powder, with the utmost unconcern, though the least dizziness, or even a failure in preserving their equilibrium, must have made them lose their seat, and dashed them to pieces against the ragged surface of the rock beneath. The fragments torn up by the explosion previous to my descent, lay in vast heaps on all sides, and the whole scene was calculated to inspire a gloomy admiration.

"I remained three quarters of an hour in these gloomy and frightful caverns, and traversed every accessible part of them, conducted by my guides. The weather above was very warm; but here the whole surface of the ground was covered with ice; I found myself surrounded with the colds of the most rigorous winter, amid darkness and caves of iron. In one of these, which ran a considerable way under the rock, were eight wretches warming themselves round a charcoal fire, and eating the scanty subsistence produced from their miserable occupation. They rose with surprise at seeing so unexpected a guest among them; and I was not a little pleased to dry my feet, wet with treading on the melted ice, at their fire.

"There are no less than one thousand eight hundred men constantly employed in these mines, and their pay is only a copper dollar, or threepence English per day. They were first opened about 1580, under the reign of John III. but have been worked constantly since that time. After having gratified my curiosity with a full view of these subterraneous apartments, I made the signal to be drawn up, and felt so little terror while re-ascending, compared with that of being let down, that I am convinced, that in five or six times, I should have been perfectly indifferent to it. So strong is the effect of custom on the human mind, and so contemptible does danger or horror become, when familiarized by constant repetition."

THE WHITE BEAR.

The white bears of Greenland differ from those of other countries, in having the head and neck of a more lengthened form, and the body longer in proportion to its bulk. The hair of these animals is long and soft as wool; the ears and eyes are small, but the teeth are large, and the limbs remarkably long. They are not only seen at land, but often on ice-floats, several leagues at sea. They are sometimes transported in this manner to the coast of Iceland; and it sometimes happens, that when a Greenlander and his wife are paddling out at sea, a white bear unexpectedly gets into their boat, and, like a passenger, suffers himself to be rowed to shore.

It appears, however, that the Greenland bear is an animal of extraordinary fierceness, and if attacked, will make astonishing exertions to avenge himself on his assailant. Barentz had the most horrid proofs of their ferocity at Nova Zembla, where they attacked and devoured many of his seamen, even in the sight of their comrades. And an instance still more remarkable is thus narrated by the Rev. Mr. Bingley, in his Animal Biography. "Not many years ago, the crew of a boat belonging to a ship in the whale-fishery, shot at a bear at a little distance, and wounded it. The animal immediately set up the most dreadful howl, and ran along the ice towards the boat. Before he reached it, a second shot was fired, and hit him. This served but to increase his fury. He presently swam to the boat, and, in attempting to get on board, reached one of his fore-feet upon the gunnel; but one of the crew, having a hatchet in his hand, cut it off. The animal still however, continued to swim after them, till they arrived at the ship; and several shots were fired at him, which also took effect: but on reaching the ship, he immediately ascended the deck; and the crew having fled into the shrouds, he was pursuing them thither, when a shot from one of them laid him dead upon the deck."

During the summer these creatures reside chiefly on the ice islands, frequently swimming from one to another; but at the approach of winter they retire, and bed themselves deep beneath the snow, where they pass the long Arctic night in a state of torpidity. Great numbers of them, however, are annually driven from their favorite retreats, by impetuous winds or currents, and perish in the open sea.

These bears produce one or two cubs at a time; and their maternal affection is so strong that they will rather die than desert their young in the hour of danger. We shall relate one instance which seems peculiarly worthy of attention. While a frigate, which was sent out some years ago to make discoveries towards the north pole, was locked in the ice, a man at the mast-head gave notice, that three bears were advancing over the frozen ocean, and directing their course directly toward the vessel; having, probably, been invited by the scent of some blubber of a sea-horse, which was burning on the ice at the time of their approach. The animals, which proved to be a she-bear and two large cubs, ran eagerly to the fire and drew out the flesh that remained unconsumed. The mariners then threw some other lumps of flesh upon the ice, which the old bear fetched away singly, and dividing each lump, gave a share to each of her cubs; but as she was fetching away the last piece she received a wound from a musket-ball, and her young ones were both shot dead. The scene now became truly affecting, and the tender concern expressed by the poor animal in the last moments of her expiring cubs, might have drawn tears of pity from any but unfeeling minds. Though desperately wounded, and scarcely able to crawl to the place where the victims lay, she carried the lump of flesh thither, divided it between them, and laid her paws first upon one, and then upon the other, anxiously endeavouring to raise them up. When she found that she could neither stir them nor entice them to eat, she went off to some distance, looked back, and mourned most piteously; but this not availing, she returned, and with

signs of inexpressible affection walked round them, pawing them and moaning. At length, perceiving them to be cold and lifeless, she raised her head towards the ship and uttered a growl of despair. This was immediately returned by a discharge of musquetry, and the affectionate animal, having fallen between her cubs, expired in the act of licking their wounds.

The usual food of these quadrupeds consists of seals, fish, and the carcases of whales; but when on land, they prey on deer, hares, young birds, and other animals; and they are also said to eat various kinds of berries. When allured by the scent of the flesh of seals, they assemble in large droves, and sometimes attempt to break into the habitations of the Greenlanders; but they are easily repulsed by the smoke of burnt feathers.

Of their astonishing sagacity in searching for prey, the following story is related. "The white bears of Greenland, notwithstanding the coldness of the climate, have an exquisite sense of smelling, and sometimes when the fishermen have dismissed the carcase of a whale, and left it floating on the waves three or four leagues from the shore, these animals will stand as near the water as they can, and raising themselves on their hind legs, snuff in the air till they are at length satisfied whence the odour comes. They then cast themselves into the sea, and swim directly toward the carcase. Their flesh is said to be coarse, and the liver is extremely unwholesome; but their skins are used for coverings of various kinds, and their tendons, when split asunder, are said to form excellent thread.

GRAND ROAD FROM PETERSBURGH TO MOSCOW.

Among other grand works, Peter I. caused a road to be cut from Peterburgh, that was to extend seven hundred and thirty-four wersts, or four hundred and

eighty-seven English miles, in a direct line; but this is not yet completed. Vast forests of fir, birch, and other trees, were cut through, and a passage made through morasses, till then thought impassable. Immense quantities of timber were hewn down, ditches were made, and the earth being thrown up and levelled, straight firs, with their surfaces made plain, were laid close to each other upon it. These were supported by a foundation of the same kind of timber composed of a row of trees, on each side secured by cross timbers. This road of timber was carried according as the land required, for about a hundred and fifty wersts, and as Mr. Hanway calculated, contained two millions and one hundred-thousand trees.

To these works it will be proper to add, that since the building of Petersburgh, the whole road between that city and Moscow has been planted with trees, to distinguish it in winter, when the country is covered with snow. These are firs planted on both sides, at the distance of twenty yards from each other, which, at a moderate computation, amount to a hundred and twenty-eight thousand four hundred and eighty trees, and at certain distances, are usually great piles of wood, in order to give light to the court, if they pass through that road in the night. On these occasions, her late Imperial majesty was drawn in a kind of house, that contained her bed, a table, and other conveniences, where four persons might take a repast. This wooden structure, which had a sloping roof, and small windows, to admit as little cold as possible, was fixed on a sledge, and drawn by twenty-four post-horses; and if any of them failed on the road, others were ready to supply their places. The empress was seldom more than three days and nights on the way; notwithstanding her having several small palaces, at which she sometimes stopped to refresh herself, and the distance being no less than four hundred and eighty-eight English miles. Peter the Great once made the journey in forty-six hours, but did not travel in the same carriage; and Mr. Busching observes, that it is not uncommon to perform it with post-horses in seventy-two hours.

ST. PAUL'S.

St. Paul's Cathedral in London is the most magnificent protestant church in the world, and one of the finest structures that any age has produced. It is said to have been originally founded by Ethelbert a Saxon prince, on the site of a temple which the Romans had formerly dedicated to Diana. It sustained several successive injuries from fire and lightning, and in the conflagration of 1666 it was totally destroyed.

The first stone of the present structure was laid by Sir Christopher Wren, on the twenty-first of June, 1675, and the design was completed in 1710; but the decorations were not finished till the year 1723.

This cathedral is built of fine Portland stone, after the model of St. Peter's at Rome; having two ranges of pilasters on the outside, one above another, the lower range of the Corinthian order, and the upper of the Composite. The spaces between the arches of the windows and the architrave of the pilasters are filled up with various decorations.

The west front is beautified with a most magnificent portico, supported by twelve massy columns of the Corinthian order; and over these are eight composite columns, supporting a beautiful pediment, in which the history of St. Paul's conversion is cut in bass relief. The ascent to this portico is by a flight of black marble steps, and over each corner of this front is an elegant turret. On the south side of the church is a portico, with a dome supported by six columns, and on the pediment is a phœnix in flames, with the word *resurgam* carved underneath it. The north portico corresponds with that on the south, and its pediment is embellished with the royal arms and other ornaments.

In the centre of the building rises a stupendous dome or cupola; and about twenty feet above the roof of the church is a circular range of columns, terminated by an entablature which supports a handsome gallery, adorned with a stone ballustrade. On the

summit of the dome is an elegant balcony, from which rises a beautiful lantern adorned with Corinthian columns, and the whole are terminated by a gilded ball and cross.

On the inside the cupola is supported by eight stupendous pillars curiously adorned: the roof of the choir is supported by six pillars, and the roof of the church by two ranges, consisting of twenty more. Round the inside of the cupola runs a handsome iron gallery, where a whisper, or even the ticking of a watch, may be heard distinctly at the distance of a hundred feet. The top of the dome is finely painted by Sir James Thornhill; the floor of the choir is paved with marble; and the altar is adorned with four pilasters painted and veined with gold, in imitation of lapis-lazuli.

The length of this cathedral from east to west, including the portico, is five hundred feet; its breadth, including the north and south porticos, three hundred and eleven; and its height, from the ground to the top of the cross, is three hundred and forty-four feet. This pile of building occupies an area of six acres, and is railed round with an iron ballustrade, which is said to have weighed nearly three hundred tons, and to have cost upwards of 11,000l. The whole expence of building the cathedral amounted to 736,752l. 2s. 3d.

At the west end of the church, and within the rails, is a marble statue of queen Anne, holding a sceptre in one hand, and a globe in the other, surrounded with four emblematical figures, representing Great Britain, France, Ireland, and America.

WESTMINSTER ABBEY.

One of the noblest specimens of Gothic architecture in England, is the abbey of St. Peter at Westminster, so called from having been the church of a convent dedicated to St. Peter, which was destroyed

by the Danes about the year 850. It was rebuilt by king Edgar, and enlarged by Edward the Confessor; but the present magnificent edifice was erected during the reign of Henry III. On the dissolution in 1539, this great monastery underwent the common fate of the religious houses; and the abbot, William Benson, having subscribed to the king's supremacy, was rewarded with the office of first dean to the new foundation, consisting of a dean and twelve prebendaries. In 1560 it was changed into a collegiate church, consisting of a dean and twelve secular canons, and other members, two school masters, forty king's scholars, twelve almsmen, and several officers and servants.

The form of this church is that of a long cross; its length is four hundred and eighty-nine feet; the breadth of the west end sixty-six: that of the cross aisle one hundred and eighty-nine; and the height of the middle roof about ninety-two feet. At the west end are two noble towers, built by Sir Christopher Wren; the nave and cross aisle are supported by fifty slender pillars of Sussex marble, about twelve feet asunder, besides pilasters. There are ninety-four windows in the upper and lower ranges, all of which, with the arches, roofs, and doors, are in the ancient Gothic style. The interior of the church is admirably executed, and the prospective is very good, particularly that of the grand aisle. The new choir, which is the work of the late Mr. Keen, is executed in the ancient Gothic style, but the architect has so happily blended simplicity with ornament, as to produce the most pleasing effect. It has also this peculiar advantage, that it can, upon solemn occasions, be easily removed, and may be replaced without much trouble or expence. The altar is extremely beautiful.

The great west window, set up in the year 1735, is finely painted with representations of Abraham, Isaac, and Jacob; the twelve patriarchs; Moses and Aaron; and the coats of arms belonging to king Sebert, Edward the Confessor, queen Elizabeth, George II. and dean Wilcocks, bishop of Rochester.

In a smaller window on the right, is a figure, sup-

posed to be that of Edward the Black Prince, and on the opposite is another, which is conjectured to represent Richard II., but the colours being of a water blue, the features cannot be particularly distinguished. The three windows at the east end contain figures of St. John the Evangelist, Melitus, bishop of London, and two pilgrims; and the beautiful north window, which was put up in 1722, represents our Saviour with his twelve apostles, and the four evangelists.

In this venerable structure are twelve sepulchral chapels, containing several curious monuments of the sovereigns and nobility of Great Britain. These are the chapels of Henry VII. St. Benedict, St. Edmund, St. Nicholas, St. Paul, Edward the Confessor, Henry V. St. Erasmus, St. John the Baptist, St. John the Evangelist, St. Michael, and St. Andrew; the three last, however, are now laid into one.

The chapel of Henry VII. is situated to the east of the abbey, and is, in point of elegance, nearly the rival of that at King's college, Cambridge. The royal founder expended fourteen thousand pounds in this building, which he expressly designed as the mausoleum of himself and his descendants.

The ascent to the interior of this chapel is from the east end of the abbey, by steps of black marble leading to the gates, which are of brass, most curiously wrought in the manner of frame-work, having a rose and portcullis alternately on every other pannel. On the first entrance the eye is naturally directed to the roof, which is divided into sixteen circles of curious workmanship, and supported by twelve stately pillars, enriched with figures, fruitage, and other ornaments. The stalls are of brown wainscot, with Gothic canopies, and the arms and banners of the knights produce a fine effect. Here are many statues in niches; and in the body of the chapel is the superb tomb of the royal founder and his queen, with their figures recumbent in brass. Here also are some elegant monuments erected to the memory of Margaret, countess of Richmond, queen Elizabeth, the unfortunate Mary Stuart, and several other illustrious personages.

Between the knight's stalls, under a broad marble pavement, is the royal vault, where repose the bodies of James I., William III., Anne, and George II. The length of this chapel is ninety-nine feet, the breadth sixty-six, and the height fifty-four.

In the chapel of St. Benedict are an ancient tomb of free-stone, supporting a recumbent statue of Langham, who was abbot of Westminster, and archbishop of Canterbury; a curious monument of black and white marble, erected in memory of Lionel Cranfield, earl of Middlesex; and a fine monument of lady Frances, countess of Hertford.

At the entrance of St. Edmund's chapel is an alabaster statue of John of Eltham, second son of king Edward II.; his habit is that of an armed knight, and his head is encircled with a coronet of leaves. On a Grecian altar in the same chapel sits a statue of lady Elizabeth Russel, who is commonly said to have lost her life by accidentally pricking her finger; but this story seems to have no other foundation than a misapprehension of the design; for, the statuary having represented her as asleep, and pointing with her finger to a death's head under her right foot, it has been supposed that the bleeding of her finger closed her eyes in death, whereas the design seems rather to allude to the serenity of her mind at the approach of death, which she considered only as a profound slumber; of which the motto, "Dormit, non mortua est," (she is not dead, but sleepeth,) is a clear confirmation. Here also are monuments to the memories of John Lord Russel, Lady Jane Seymour, William de Valence, and Mary countess of Stafford, wife to the unfortunate viscount, who suffered decapitation, in the reign of Charles II. on Tower-hill.

In the chapel of St. Nicholas are a magnificent temple of various coloured marble, erected in honour of Ann duchess of Somerset; a most sumptuous monument to the memory of lady Burleigh; two beautiful pyramids, erected in remembrance of Nicholas Bagenall, and Anna Sophia Harley, who died in their infancy; and several other elegant monuments.

On the west side of this chapel is a beautiful monument to the memory of the late duchess of Northumberland, who is represented sitting on a sofa, and dispensing her bounty to a groupe of indigent beings who surround her. The figures on each side appear to be Faith and Hope, and those above are weeping genii mourning over her urn.

At the entrance of St. Paul's chapel is a lofty monument to the memory of Sir John Puckering, lord keeper of the great seal of England in the reign of queen Elizabeth. Here also are a magnificent monument of alabaster, with pillars of Lydian marble, raised to the memory of Sir Thomas Bromley, privy coun sellor and chancellor to queen Elizabeth: an alabaster statue of Frances, countess of Sussex; and a very an cient monument of Lewis Robert, standard-bearer to Henry V.

The shrine of Edward, which stands in the centre of the chapel consecrated to that saint, was once extremely magnificent, but is now neglected, defaced, and sadly abused. On the north side of this chapel is an ancient tomb of admirable workmanship and materials, the pannels being of polished porphyry, and the surrounding Mosaic work of gold and scarlet: at the corners of the table are twisted pillars gilt and enamelled, and the statue of Henry III. upon it, is of gilded brass, finely executed. The tombs of Edward I. surnamed Longshanks; John Waltham, twenty-sixth bishop of Salisbury; Elizabeth Tudor, second daughter of king Henry VII.; and Eleanor, queen of Edward I. must also be noticed in this place.

Separated only by an iron screen, is the chapel of Henry V. which contains the magnificent tomb of its founder, who acquired immortal honour by the memorable battle of Agincourt: the sword and shield of Edward III.; a waxen figure of Edmund Sheffield, duke of Buckingham; and two ancient chairs, which are used by the kings and queens of England at their coronation. In a chantry over this chapel are an helmet, shield, and saddle, said to have been used by Henry V. at the battle of Agincourt; and here also

are some curious models, designed by Sir Christopher Wren, and other eminent architects.

St. Erasmus's chapel contains some fine monuments; among which those of Henry Carey, first cousin of queen Elizabeth; Thomas Carey, gentleman of the bed-chamber to king Charles I. and Thomas Cecil, earl of Exeter, claim particular notice.

The chapel of St. John the Baptist contains but two handsome monuments; that of John Islip, abbot of Westminster, and that of Sir Christopher Hatton. But in the chantry above, there are some wax figures of queen Elizabeth, king William and queen Mary, queen Anne, and the famous earl of Chatham, in his parliamentary robes.

In the chapel of St. John the Evangelist are some handsome monuments, of which the most remarkable are inscribed to the memory of Sir Francis Vere, and of Sir George Pocock; the latter of whom acquired immortal reputation by his gallant conduct at the reduction of Geriah, Chandernagore, and the Havannah. The tomb of this hero is ornamented with a figure of Britannia, a fine medallion, and some emblematical devices.

The chapel of St. Michael contains some of the finest monuments in Westminster Abbey. The tomb of Joseph Gascoigne Nightingale and his lady, is the work of M. Roubiliac, and is justly admired by all judges of merit. Above is represented a lady expiring in the arms of her husband; beneath, slily peeping from a tomb, the king of terrors presents his dreadful visage, and points his unerring dart at the sinking figure, while the distracted husband seems to clasp her to his bosom, and attempts to defend her from the fatal stroke. Opposite to this beautiful monument is that of the earl and countess of Mountrath, which is equally entitled to our admiration from the grandeur of the design, and the extraordinary lightness of the execution. On the summit is a representation of the celestial mansions, and their blessed inhabitants; and on a sarcophagus beneath, is the figure of the countess, in the attitude of rising from the grave, and supported

by an angel, who, with his right hand points up to heaven, where a seat is prepared for her reception, and where another angel waits to crown her with a wreath of glory.

The chapel of St. Andrew contains monuments to the memory of several honourable personages; but the most elegant are those of Sir Henry Norris, famous for his gallant conduct in the Low Countries, during the reign of queen Elizabeth, and Susanna Jane Davidson, who is represented just expiring, Death having pierced her breast with his fatal dart: an angel supports the female figure, and appears to offer consolation by pointing to the joys of futurity.

The tombs in the area and aisles of the church are far too numerous to admit of description in a work of this nature. Suffice it, therefore, to say, that many of them are indeed master-pieces in the art of sculpture, and that among the most celebrated, the spectator may recognise those of general Wolfe, the earl of Mansfield, William Shakspeare, Matthew Prior, John Milton, James Thomson, Nicholas Rowe, John Gay, Oliver Goldsmith, Abraham Cowley, Geoffery Chaucer, George Frederick Handel, Sir Isaac Newton, and many others who have acquired immortal reputation by the brilliancy of their genius, or the happy result of their extraordinary exertions.

THE TOWER.

Of the several fortresses in Great Britain, the most remarkable is the Tower of London, situated on the east side of that city, near the bank of the Thames. It was anciently a royal palace, and consisted of no more than what is now called the White Tower, which appears to have been first marked out by William the Conqueror, in the year 1076, and completed by his son William Rufus, who, in 1098, surrounded it with walls, and a broad and deep ditch. Several succeeding princes made additions to it, and king Ed-

ward III. rebuilt the church. In the year 1638 the White Tower was rebuilt; and since the restoration of king Charles II. it has been thoroughly repaired, and a great number of additional buildings made to it. At present, besides the White Tower, here are the offices of ordnance, of the keepers of the records, the jewel office, the Spanish armoury, the horse armoury, the new or small armoury, barracks for the soldiers, and several handsome houses; so that the Tower of London has at present more the appearance of a town than a fortress. Upon the wharf was a line of about sixty pieces of cannon, which have been removed. On this side of the Tower the ditch is narrow, and over it is a draw-bridge: under the tower-wall, on the same side, is a water-gate, commonly called Traitor's Gate, because it had been customary to convey traitors and other state prisoners through it by water, to and from the Tower.

Parallel to the wharf, upon the walls, is a platform seventy yards in length, called the Ladies Line, whence there is a fine prospect of the shipping and the river Thames. From this line there is a walk round the Tower walls, on which are three batteries distinguished by the names of the Devil's Battery, the Stone Battery, and the Wooden Battery, each of which is mounted with several pieces of brass cannon.

The principal entrance to the Tower is by two gates one within the other, on the west side, both large enough to admit carriages, and parted by a stone bridge, built over the ditch.

The principal officers of the Tower are a constable, a lieutenant, and a deputy-lieutenant.

Within the outer gate is the Lion Tower, in which is a fine collection of wild beasts, consisting of lions and lionesses, with a great variety of birds; which are all regularly fed, and carefully attended.

In the first story of the White Tower is an armoury for the sea-service, containing various sorts of arms curiously laid up, for above ten thousand seamen; and the upper stories are filled with arms, and other

warlike instruments, as spades, shovels, pickaxes, and cheveaux-de-frize.

Near the south-west angle of the White Tower is the Spanish armoury, being the depositary of the spoils of the Spanish armada, fitted out by Philip II. of Spain, to invade England in the reign of queen Elizabeth. It consisted of one hundred and thirty-two ships, of which scarcely seventy returned home; and of thirty thousand troops on board, of which twenty thousand were either killed, drowned or made prisoners in England. The trophies preserved here of this memorable victory are as follow;—A Spanish battle-axe with a pistol in the handle and a match-lock; the Spanish general's halbert, covered with velvet, the nails are double gilt, and on the top is the pope's head curiously engraven. An engine called the Spanish morning star, from its figure, which is that of a star. Of this kind of engine there were many thousands on board, all with poisoned points, designed to strike at the English in case they ventured to board the Spanish fleet. Thumb-screws, of which there were several chests full on board, intended to extort a confession from the English where their money was hid. A Spanish poll-axe, used in boarding of ships. Spanish halberts, or spears, some of which are curiously engraved, and inlaid with gold. Spanish spadas or long swords, poisoned at the points. Spanish cravats, consisting of engines of torture, made of iron, and put on board to lock the feet, arms, and heads together, of such as the Spaniards called English heretics. Bilboes, being instruments also made of iron, for yoking the English prisoners two and two. Spanish shot, of which there are four different sorts —pike-shot, star-shot, chain-shot, and link-shot, all admirably contrived, as well for the destruction of the masts and rigging of ships, as for sweeping the men off the decks. The banner, with a crucifix on it, which was to have been carried before the Spanish general. An uscommon piece of arms, consisting of a pistol in a shield, contrived in such a manner, that the pistol might be fired, and the body covered at the

same time; it is to be fired by a match-lock, and the sight of the enemy taken through a little grate in the shield, which is pistol-proof. The Spanish rançeur, made in different forms, and intended either to kill the men on horseback, or to pull them off their horses; and on one of them is a piece of silver coin, which the Spaniards intended to have made current in England. The Spanish officers lances, finely engraved and gilt. The common soldiers pikes, eighteen feet in length, pointed with long sharp spikes, and shod with iron. The Spanish general's shield, which was to have been carried before him as an ensign of honour; upon which are depicted, in most curious workmanship, the labours of Hercules.

Here also are deposited several Danish and Saxon clubs, a sort of weapons which the Danes and Saxons are said to have used in their conquests of England; an instrument called king Henry the Eighth's walking-staff, with three match-lock pistols in it, and coverings to keep the charges dry; a large wooden cannon, called Policy, because, as is said, when king Henry VIII. besieged Boulogne, the roads being impassable for heavy cannon, he caused a number of these wooden ones to be made, and mounted on proper batteries before the town, as if real cannon, which so terrified the French commandant, that he gave up the place without firing a shot; and the axe with which Ann Bullen, the mother of queen Elizabeth, and the earl of Essex, the favourite of queen Elizabeth, were beheaded.

The other curiosities in this place are, a train of little cannon, neatly mounted on proper carriages, being a present from the foundry of London to king Charles I. when a child, to assist him in learning the art of gunnery; weapons made with the blades of scythes, fixed strait to the ends of poles, and taken from the duke of Monmouth's party at the battle of Sedgemoor, in the reign of James II.; the partizans that were carried at the funeral of king William III.; and a model of an admirable machine, the design of which was brought from Italy, by Sir Thomas Lombe,

at the hazard of his life. The latter object of attention is a mill for the manufacture of silk, and was first erected in the year 1734, by Sir Thomas, at his own expence, in an island of the river Derwent, facing the town of Derby. It works three capital engines for making orgazine, or thrown silk; has twenty-six thousand five hundred and eighty-six wheels; and ninety-seven thousand seven hundred and forty-six movements, which are all worked by one water-wheel, that turns round three times in a minute. By every turn of the water-wheel, the machine twists seventy-three thousand seven hundred and twenty-six yards of silk thread, so that in twenty-four hours it will twist three hundred and eighteen million four hundred and ninety-six thousand three hundred and twenty yards; yet any single wheel or movement may be stopped, without impeding the rest; and the whole is governed by one regulator. This machine was thought of such importance by the legislature, that, on the expiration of the patent which Sir Thomas had obtained for the sole use of it during fourteen years, the parliament granted him fourteen thousand pounds as a farther recompence for the hazard he ran, and the expence he had incurred, by introducing and erecting it, on condition that he should suffer a perfect model of it to be taken, in order to secure and perpetuate the invention.

Northward of the White Tower is a noble building, called the Grand Store-house, extending two hundred and forty-five feet in length, and sixty in breadth. It was begun by king James II. and finished by William III. who erected that magnificent room called the New or Small Armoury, to which there is a passage by a folding-door, adjoining to the east end of the Tower chapel, which leads to a grand stair-case of easy ascent. On the left side of the uppermost landing is a workshop, in which are constantly employed about fourteen furbishers, in cleaning, repairing, and arranging the arms contained in this place; which are so artfully disposed, that at one view may be seen arms for nearly two hundred thousand men, all bright and

fit for service at a moment's warning. Of the disposition of these arms no adequate idea can be formed by description; and there are a thousand peculiarities in the disposition of so vast a variety which no description can reach.

Upon the ground-floor, under the small armoury, is a large room of equal dimensions with that, supported by twenty pillars, all hung round with warlike implements. This room, which contains the royal train of artillery, is twenty-four feet high, and is full of the most dreadful engines of destruction; besides harness for horses, men's harness, drag-ropes, trophies of standards, colours, &c.

Eastward of the White Tower, is the Horse-armoury, consisting of a plain brick building, in which are several curiosities.

Before the room door is the figure of a grenadier in his accoutrements, as if upon duty, with his piece rested upon his arm. Within the room, on the left hand, are figures as large as life, of horse and foot, supposed to be drawn up in military order, to attend a line of kings on the other side of the room, shown in the following order:—King George I. in a complete suit of armour, with a truncheon in his hand, seated on a white horse, richly caparisoned, having a fine Turkey bridle, gilt, with a globe, crescent, and star, velvet furniture laced with gold, and gold trappings. King William III. dressed in the suit of armour worn by Edward the Black Prince, at the battle of Cressy; he is mounted on a sorrel horse, whose furniture is green velvet, embroidered with silver, and holds in his right hand a flaming sword. King Charles II. dressed in armour, with a truncheon in his hand, seated on a fine horse, richly caparisoned, with crimson velvet, laced with gold. King Charles I. in a rich suit of gilt armour, curiously wrought, presented to him by the city of London, when he was prince of Wales. James I. in a complete suit of figured armour, with a truncheon in his right hand. King Edward VI. in a curious suit of steel armour, whereon are depicted, in different compartments, a variety of scripture histo-

ries: he sits like the rest on horseback, with a truncheon in his hand. King Henry VIII. in his own armour, which is of polished steel, with the foliages gilt, and bearing a sword in his right hand. King Henry VII. who also holds a sword, and is seated on horseback in a complete suit of armour, finely wrought, and washed with silver. King Edward V. who, with his brother Richard, was smothered in the Tower, by order of their uncle and guardian Richard III.; and having been proclaimed king, but never crowned, a crown is suspended over his head; he holds a lance in his right hand, and is dressed in a rich suit of armour, studded, with a drawn sword in his hand. King Henry VI. Henry V. and Henry IV. King Edward III. with a venerable beard, in a suit of plain bright armour, with two crowns on his sword, alluding to his having been crowned king both of England and France. King Edward I. dressed in a very curious suit of gilt armour, and in shoes of mail, with a battle axe in his hand. And William the Conqueror, the first in the line, though the last shown, in a suit of plain armour.

The other principal curiosities in this room are a large tilting-lance of Charles Brandon, duke of Suffolk; a complete suit of armour, made for king Henry VIII. when he was but eighteen years of age, rough from the hammer; a small suit of armour made for king Charles II. when he was about seven or eight years of age, with a piece of armour for his horse's head; real coats of mails, called Brigandine jackets, consisting of small bits of steel, so artfully quilted one over another, as to resist the point of a sword, and perhaps a musket ball, and yet so flexible, that the wearer may bend his body any way, as well as in an ordinary suit of clothes; an Indian suit of armour, sent by the great mogul as a present to king Charles II.; the armour of John of Gaunt, duke of Lancaster, the son of Edward III.; and a droll figure of one William Somers, said to have been jester to king Henry VIII.

Over the door of the armoury, on the inside, is a

target, on which are engraved the figures of Justice, Fortune and Fortitude; and the walls of the room are entirely lined with various pieces of armour for horses heads and breasts, targets, and many pieces that now want a name.

About twenty yards east of the grand store-house, or new armoury, is the Jewel Office: a dark stone room, in which the jewels of the crown are deposited. The jewels shown at this time are those following:

The imperial crown, with which it is pretended all the kings of England have been crowned since Edward the Confessor, in 1042. It is of gold, enriched with diamonds, rubies, emeralds, sapphires, and pearls. The cap within is of purple velvet, lined with white taffety, turned up with three rows of ermine. The golden orb, or globe, put into the king's right hand, before he is crowned; and borne in his left, with the sceptre in his right, upon his return into Westminster-hall, after he is crowned at Westminster-abbey.

The globe is about six inches in diameter, edged with pearl, and enriched with precious stones. On the top is an amethyst of a violet colour, nearly an inch and a half high, set with a rich cross of gold, adorned with diamonds, pearls, and other jewels; the whole height of the ball is eleven inches.

The golden sceptre, with its cross set upon a large amethyst of great value, garnished round with table-diamonds. The top rises into a fleur-de-lis of six leaves, all enriched with precious stones; from whence issues a mound, or ball, made of the amethyst already mentioned. The sceptre with the dove, the emblem of peace, perched on the top of a small Jerusalem cross, finely ornamented with table-diamonds, and jewels of great value. St. Edward's staff, four feet seven inches and a half in length, and three inches three quarters in circumference, all of beaten gold, which is carried before the king at his coronation. The rich crown of state worn by his majesty in parliament, in which is a large emerald, seven inches round, a pearl esteemed the finest in the world, and a ruby of inestimable value. The crown belonging to

the prince of Wales, which is carried together with the king's crown, as often as his majesty goes to the parliament-house, by the keeper of the jewel office, attended by the warders, to Whitehall, where both crowns are delivered to the officers appointed to receive them, who, with some yeomen of the guard carry them to the robing rooms adjoining to the House of Lords, where his majesty and the prince of Wales put on their robes. The king wears his crown on his head while he sits upon the throne; but that of the prince is placed before him. As soon as the king is disrobed the crowns are carried back to the tower, and again locked up in the jewel office.

The crown, globe, and sceptre of queen Mary, with the diadem she wore at her coronation with her consort William III. An ivory sceptre, with a dove on the top, made for the queen of James II. whose garniture is gold, and the dove on the top gold, enamelled with white. The curtana, or sword of mercy, the blade of which is thirty-two inches long, and nearly two broad, without a point, carried before the king at his coronation, between the two swords of justice. The golden spurs, and the armillas, or bracelets for the wrists, which, though very antique, are worn at the coronation. The ampulla, or eagle of gold, which is finely engraved, and holds the holy oil the kings and queens of England are anointed with; and the golden spoon that the bishops pour the oil into. The eagle and spoon are pieces of great antiquity; the former, including the pedestal, is about nine inches high, and the wings expand about seven inches; the head of the eagle screws off about the middle of the neck, which is made hollow for holding the holy oil; and when the king is anointed, the oil is poured into the spoon out of the bird's bill.

A rich salt-seller of state, in the form of the square white tower; the workmanship is exquisitely fine: it is of gold, and used only on the king's table at the coronation. A noble silver font, double gilt, and elegantly wrought; in which the royal family are christened. And a large silver fountain presented to

Charles II. by the town of Plymouth, curiously wrought. Here also are deposited all the crown jewels worn by the princes and princesses at coronations, and an abundance of curious old plate.

THE AIR PUMP.

The invention of this noble instrument, to which the present age is indebted for so many fine discoveries, is ascribed to Otto de Guerick, a consul or burgomaster of Magdebourg, in Germany, who exhibited his first experiments before the emperor and the states of Germany, at Ratisbon, in the year 1654. Some persons, indeed, have ascribed the invention to the honourable Mr. Boyle, and the engine has obtained the name of machina Boyleana; but this is rather on account of the improvements made in it, or the various experiments it was applied to, by that great philosopher: for though he had actually made some attempts of this nature before he knew any thing of what was done in Germany, yet he ingenuously confesses de Guerick to have been beforehand with him, and that it was the information he afterwards received from a book published by Schottus, containing an account of de Guerick's experiments, which enabled him to bring his design to maturity. This machine has been of late years much improved, and seems now to be brought to its utmost perfection.

The use and effect of the air-pump is to exhaust the air out of any proper vessel, and thereby make what is properly called a vacuum, which in reality is only such a degree of rarefaction as is sufficient to suspend the ordinary effects of the atmosphere. Hence therefore we learn, in some measure, what our earth would be without the mass of air which surrounds it, and how indispensibly necessary it is to the life, generation, and nutrition both of animals and vegetables, and to various other purposes. The principle on

which this machine is founded is the elasticity or spring of the air; and the basis or essential part of it is a metalline tube, answering to the barrel of a common pump or syringe, having a valve at the bottom, opening upwards, and a moveable piston or embolus, answering to the sucker of a pump, furnished likewise with a valve opening upwards; the whole properly fitted to a vessel as a receiver, whence the air is to be exhausted. The other parts, chiefly respecting conveniency, have been diversified and improved from time to time; and particularly Mr. Hawksbee, by adding a second barrel and piston to the former, to rise as the other falls and fall as it rises, has greatly facilitated the working of the engine. To this gentleman we are indebted for the structure of the air-pump now in common use: but Mr. Martin contrived one of a different form, which he called a portable air-pump, being so constructed, that it might, together with its receivers, be contained in a box of a small size, and sold at a moderate price.

The reader must observe, as we have already hinted, that an absolute vacuum cannot be obtained by the air-pump, i. e. all the air cannot be exhausted out of the receiver, be the pump ever so good, or worked ever so long; for as the air which is drawn out is only expelled by the spring of that which remains behind, if we suppose every particle to be exhausted, the last must be expelled without an agent, or there would be an effect without a cause. But the air is dilated by this machine to such a degree, that bodies placed in an exhausted receiver are usually said to be in vacuo; and by this means a vast number of curious experiments have been made, which have thrown great light upon the secrets of nature, and of which we shall mention a few of the most remarkable, for the entertainment of those who are unacquainted with such phænomena.

First then, to demonstrate the spring of the air, if a bottle whose mouth is securely sealed, so that no air can escape from within, be placed under a receiver, and the air exhausted from the surface of the bottle,

the spring of the included air will burst it to pieces. 2. If a bladder be almost emptied of air, and tied very tight, the air within will expand itself "in vacuo," so as to make the bladder appear full blown. 3. By making a little hole in the small end of a new-laid egg, and exhausting the receiver, the bubble of air contained between the shell and the skin at the great end will expand itself, so as to force the white and yolk of the egg through the hole; and if half the shell of the egg thus emptied be taken off, the said bubble will raise up the skin, so as to resemble an entire egg. 4. A shrivelled apple will become smooth and plump under the exhausted receiver, by the expansion of the air contained in its substance. 5. Fishes are made so light by increasing the spring of the air in their bladders, upon exhausting the receiver, that they rise to the top of the water, and cannot again descend to the bottom. 6. Water heated as hot as the finger can well bear it, will boil vehemently under the exhausted receiver; but upon letting the air in again, the agitation ceases. 7. Fresh small-beer placed *in vacuo* rises up in froth, dies, and loses all its taste. 8. Vegetable substances put in water under the receiver admit great quantities of air from all parts of their surface. 9. The weight or pressure of the air is shown by exhausting two hollow brass hemispheres, which are then compressed together by the external air, so as to require a force to pull them asunder equal to one hundred and eighty-eight pounds, if the diameter of the hemispheres be four inches. 10. A person placing his hand on the top of an open receiver, will feel a very sensible pressure of the air on the back of his hand, in proportion as the receiver is exhausted; and the spring of the air contained in the flesh exerting itself at the same time, the inside of his hand swells downwards into the receiver. 11. If the air be exhausted from a thin bottle placed under a receiver, and then suddenly let in again, its weight will instantly crush the bottle to pieces. 12. If a piece of wood be cemented in the lower part of the neck of an open receiver, and mercury poured upon it, after

two or three exhaustions the pressure of the external air will be so great on the mercury as to cause it to descend through the pores of the wood in form of a beautiful shower, which will shine in a dark room. 13. The lightest and heaviest bodies descend with equal velocity *in vacuo;* thus a guinea and a feather let fall from the top of a tall exhausted receiver, arrive at the bottom both together. 14. It appears that air is necessary to the existence of fire and flame; for a piece of burning charcoal, or a lighted candle, is soon extinguished in the exhausted receiver: neither will gunpowder flash or make any explosion, but melt and die away. 15. Air is likewise proved to be the medium of sounds; for a bell rung *in vacuo* is not heard; but as the air is admitted into the receiver, the sound increases in proportion. 16. That fermentation and putrefaction depend on the air, is shown by preserving fruits in their native bloom and perfection through the winter in an exhausted glass: and eggs, which in the air soon grow stale and putrid, retain their goodness a long time *in vacuo*. 17. How necessary air is to vegetation appears from hence, that seed sown in earth kept under an exhausted receiver will not grow at all. 18. Air is likewise absolutely necessary to most sorts of animals, though some will live a long time *in vacuo*, whilst others expire presently.

Dr. Derham observed, from various experiments, that animals whose hearts have two ventricles and no foramen ovale, as birds, dogs, cats, mice, &c. die in less than half a minute under a small exhausted receiver. A mole died in one minute: a bat remained four minutes and a half, and revived upon re-admitting the air; but in twenty minutes he was dead beyond recovery. Wasps, bees, grasshoppers, and other insects, appeared dead in two minutes: but revived in the open air, after they had lain twenty-four hours *in vacuo*. Snails continued twenty-four hours under the exhausted receiver, and seemed not much affected. Frogs and toads bear the pump a long time, especially the former; one of which recovered in the open air, after remaining eleven hours in the receiver.

Fish are not easily killed by the air pump. At first they appear greatly disturbed, swoln and sickish; but Mr. Hawksbee says, he has kept them a week and found them as lively as those which had been kept as long in the air.—Slow-worms, according to Mr. Boyle, will live two or three days *in vacuo,* and leeches five or six.

The same Otto de Guerick, who invented the air-pump, contrived a new sort of air-gun, which discharged shot by the rarefaction of the air, whereas the common air-guns produce their effects by its compression. Dr. Papin improved upon de Guerick's invention, and experiments were made before the Royal Society to try the force of his machine; which was very considerable, but not equal to those whose structure is founded on the compression of the air. Of these the most common and portable kind consists of two barrels, one of a small bore, into which the bullet is rammed as in other guns, and another on the outside, so large as to leave a space between them, wherein the air is be to enclosed. Into this cavity the air is injected through a valve, by a syringe fixed in the stock of the gun, and the discharge is made by drawing a trigger, which opens another valve, whereupon the compressed air rushes through a hole into the inner barrel, and expels the bullet with great violence. There is also a contrivance in the lock, that either the whole charge of air may be spent at one explosion, or only part of it, and the rest reserved for fresh bullets; but the force is much greater, if all the air be discharged upon one single bullet. The magazine air-gun is so contrived, that ten bullets, lodged in a cavity near the place of discharge, may be drawn one by one into the shooting barrel, and successively exploded in a very expeditious manner. Dr. Burnet observes that a gunsmith at Basil, showed him one of these machines, and pretended the invention was his own, which must be acknowledged to be curious; but as the discharge of air-guns is attended with an inconsiderable report compared to that of fire-arms, nor is there any flash like that of gunpowder to discover

from what hand the shot comes, it seems the interest of mankind to forbid the use of instruments so convenient for assassination.

WHIRLPOOLS.

Near the coast of Norway, in about latitude 63, is a vast whirlpool, commonly called Maelstrom, or Moskoestrom, from the island of Moskoe, and by mariners the navel of the sea. Its violence exceeds that of a cataract, being heard at a great distance, without any intermission, except for a quarter of an hour, at the turn of high and low water, when its impetuosity seems at a stand: but this motion soon returns, and gradually increases with such a draught and vortex, as absorbs whatever comes within their sphere of action, keeping it for some hours under water, when the fragments shivered by the rocks appear again. From this circumstance several authors imagine, that here is an abyss, which penetrates the globe, issuing in some very remote parts. But the learned bishop Pontoppidon observes, that there is no foundation for this conjecture; it having no other cause than the collision of the waves, rising and falling at the flux and reflux against a ridge of rocks and shelves, which confine the water, so that it precipitates like a cataract; and thus the higher the flood rises, the deeper must be the fall, the natural result of which is a whirlpool. Mr. Ramus is of the same opinion, and observes, that at the time of flood, the streams ran up the country, between the islands of Lofoden and Moscoe, with a boisterous rapidity; but the roar of its impetuous ebb to the sea, is scarcely equalled by the loudest cataracts, the noise being heard at the distance of several leagues. The whirlpool is then of such extent and depth, that if a ship comes within its attraction, it is inevitably absorbed, and dashed to pieces against the rocks at the bottom. But when the stream is most boisterous, and its fury heightened

by a storm, it is dangerous to come within six English miles of it; ships, boats, and yachts, having been carried away by not guarding against it, before it was too late. It frequently happens that even whales, coming too near the stream, are overpowered by its violence; and then it is impossible to describe their bellowings in their fruitless struggles to disengage themselves. A bear once attempting to swim to the island of Moscoe, in order to prey on the sheep feeding on the island, afforded a similar spectacle; for the stream caught him, and bore him down, while he roared so terribly as to be heard on shore. It is remarkable that large firs and pine trees, after being absorbed by the current, rise again with their trunks so broken and lecerated, that they seem as if covered with bristles.

The account we have of the whirlpools about the islands of Ferro, which belong to the crown of Denmark, given us by Mr. Jacobson Debes, provost of the churches in those islands, is also very extraordinary. The most dangerous is that which lies south of Suderoe, near a rock called the Monk, where several vessels have been swallowed up. The sea round this whirlpool is eighty or ninety fathoms deep, and the surface of the water is smooth and serene: but a little farther in, the ground lies at the depth of twenty-five or thirty fathoms, where the sea begins to rise and turn round. Within this the ground lies from eight to ten or twelve fathoms deep, in four circles; and rises up in points or clifts, which are about eight fathoms under water, and about twelve distant from each other. Between these circles are three channels from twenty-five to thirty fathoms deep, wherein the sea runs round: and within every circle is a hole, the depth of which, in the middle, is above sixty fathoms. The innermost current turns round but slowly, but the others with great swiftness. On the south side of this hole the rock called the Monk rises ten fathoms above water, and north of this are six lesser rocks, on the top of which, our author observes, the compass runs round like the whirlpool. Considering the dan-

ger that vessels run by approaching this vortex, the reader may probably wonder how so particular a description of it could be taken; but our author informs us, that in very calm weather, during the reflux of the sea, the inhabitants venture to fish there, and to climb the rocks.

THE SPIDER.

M. Leewenhoeck having dissected the body of the largest spider he could find, and nicely examined each part, at last discovered the vast number of instruments from whence the spider draws threads of various fineness, which he judged to be at least four hundred, lying not close together, but in several distinct clusters. At another time this gentleman took a spider, and laid it upon its back so that it could not stir, and then pulled out, with a very fine pair of pincers, a thread that he perceived sticking out of one of the working instruments. At the same time he saw many fine threads issuing out of its body, which, at the distance of a hair's-breadth or two from the body, joined together and made thick threads. Hence it appears, that the threads of a spider's web, which to the naked eye seem to be single, do really consist of several threads; some of which, even supposing the spider full-grown, are so exceedingly fine, that M. Leewenhoeck thought a hundred of them put together would not make a hundredth part of the thickness of a hair of his head. Ten thousand, therefore, of the fine threads of a full grown spider are not so thick as a hair; and if we add to this, that four hundred young spiders, when they first begin to spin, are not, one with another, bigger than a full-grown one, and that each of those spiders are provided with all the instruments of the old one, it will follow, that the smallest thread of a young spider is four hundred times smaller than that of a great one; and that four millions of such

threads are not so thick as a hair of a man's head; which is a fineness perfectly astonishing, and beyond our conception.

THE ART OF CASTING ALL SORTS OF METALS.

1. *Foundry of small-works, or casting in sand.* The sand is, at first, of a yellowish colour, and a soft and clammy nature: but charcoal-dust being strewed in the mould, it soon becomes of a black colour, and loose texture.

In founding, the hollow of a wooden board, of a length and breadth proportional to the things to be cast, and surrounded with a ledge sufficiently deep, is filled with sand, a little moistened, to make it cohere. Then they take either wood or metal models of what they intend to cast, and so apply them to the mould, and press them into the sand, as to leave their impression there. Along the middle of the mould is laid half a small brass cylinder, as the chief canal for the metal to run through, when melted, into the models or patterns; and from this chief canal are placed several others, which extend to each model or pattern placed in the frame. After this frame is finished, they take out the patterns, by first loosening them all round, that the sand may not give way.

They now proceed to work the other half of the mould with the same patterns in just such another frame, only that it has pins, which, entering into holes that correspond to it in the other, make the two cavities of the pattern fall exactly on each other.

The frame thus moulded is carried to the melter, who, after extending the chief canal of the counterpart, and adding the cross canals to the several models in both, and strewing mill-dust over them, dries them in a kind of oven for that purpose.

Both parts of the mould being dry, they are joined together by means of the pins; and, to prevent their

giving way, by reason of the melted metal passing through the chief cylindrical canal, they are screwed or wedged up like a kind of a press.

While the moulds are thus preparing, the metal is fusing in a crucible of a size proportionate to the quantity of metal intended to be cast.

Some of these small-work founder's furnaces are like a smith's forge; others stand a few feet underground, for the more easily and safely taking out a weighty pot of metal; which is done by means of a circular tongs that grasps round the top of the crucible. When the metal is melted, the workman pours it through the chief canal of each mould, which conveys it to every distinct pattern.

When the moulds are cool, the frames are unscrewed, or unwedged, and the cast work taken out of the sand, which sand is worked over again for other castings.

2. *Foundery of statues.* The casting of statues depends on the due preparation of the pit, the core, the wax, the outer mould, the inferior furnace to melt off the wax, and the upper to fuse the metal. The pit is a hole dug in a dry place something deeper than the intended figure, and made according to the prominence of certain parts thereof. The inside of the pit is commonly lined with stone, or brick; or, when the figure is very large, they sometimes work on the ground, and raise a proper fence to resist the impulsion of the melted metal.

The inner mould, or core, is a rude mass to which is given the intended attitude and contours. It is raised on an iron grate, strong enough to sustain it, and is strengthened within by several bars of iron. It is generally made either of potter's clay, mixed with hair, and horse-dung; or of plaster of Paris mixed with brick-dust. The use of the core is to support the wax and shell, and lessen the weight of the metal. The iron bars and the core are taken out of the brass figure through an aperture left in it for that purpose, which is soldered up afterwards. It is necessary to leave some of the iron bars of the core, that contribute

to the steadiness of the projecting part within the brass figure.

The wax is a representation of the intended statue. If it be a piece of sculpture, the wax should be all of the sculpture's own hand, who usually forms it on the core; though it may be wrought separately in cavities, moulded on a model, and afterwards arranged on the ribs of iron over the grate; filling the vacant space in the middle with liquid plaster and brick-dust, whereby the inner core is proportioned as the sculptor carries on the wax. When the wax, which is the intended thickness of the metal, is finished, they fill small waxen tubes perpendicular to it from top to bottom, to serve both as canals for the conveyance of the metal to all parts of the work, and as vent-holes, to give passage to the air, which would otherwise occasion great disorder, when the hot metal came to encompass it.

The work, being brought thus far, must be covered with its shell, which is a kind of crust laid over the wax, and which, being of a soft matter, easily receives the impression of every part, which is afterwards communicated to the metal upon its taking the place of the wax, between the shell and the mould. The matter of this outer mould is varied according as different layers are applied. The first is generally a composition of clay, and old white crucibles well ground and sifted, and mixed up with water, to the consistence of a colour fit for painting: accordingly they apply it with a pencil, laying it seven or eight times over, and letting it dry between whiles. For the second impression, they add horse-dung and natural earth to the former composition. The third impression is only horse-dung and earth. Lastly, the shell is finished by laying on several more impressions of this last matter, made very thick with the hand.

The shell, thus finished, is secured by several iron girts bound round it, at about half a foot distance from each other, and fastened at the bottom to the grate under the statue, and at top to a circle of iron where they all terminate. If the statue be so large

that it would not be easy to move the moulds with safety, they must be wrought on the spot where it is to be cast. This is performed two ways: in the first, a square hole is dug under-ground, much bigger than the mould to be made therein, and its inside lined with walls of free-stone, or brick. At the bottom is made a hole of the same materials with a kind of furnace, having its aperture outwards: in this is a fire made to dry the mould, and afterwards melt the wax. Over this furnace is placed the grate, and upon this the mould, &c. formed as above. Lastly, at one of the edges of the square pit, is made another large furnace to melt the metal. In the other way, it is sufficient to work the mould above-ground, but with the like precaution of a furnace and grate underneath. When finished, four walls are to be run around it, and by the side thereof a massive one made for a melting furnace. For the rest, the method is the same in both. The mould being finished, and inclosed as described, whether under-ground or above it, a moderate fire is lighted in the furnace under it, and the whole covered with planks, that the wax may melt gently down, and run out at pipes contrived for that purpose, at the foot of the mould, which are afterwards exactly closed with earth, so soon as the wax is carried off. This done, the hole is filled up with bricks thrown in it at random, and the fire in the furnace augmented, till such time as both the bricks and mould become red hot. After this, the fire being extinguished, and every thing cold again, they take out the bricks and fill up their place with earth, moistened, and a little beaten to the top of the mould, in order to make it the more firm and steady. These preparatory measures being duly taken, there remains nothing but to melt the metal, and run it into the mould. This is the office of the furnace above described, which is commonly made in the form of an oven with three apertures, one to put in the wood, another for a vent, and a third to run the metal out at. From this last aperture, which is kept very close, while the metal is in fusion, a small tube is laid, whereby the melted metal is conveyed into a large

earthen bason, over the mould, into the bottom of which all the big branches of the jets, or casts, which are to convey the metal into all the parts of the mould, are inserted. These casts, or jets, are all terminated with a kind of plugs, which are kept close, that, upon opening the furnace, the brass, which gushes out with violence, may not enter any of them, till the bason be full enough of matter to run into them all at once. Upon which occasion, they pull out the plugs, which are long iron rods with a head at one end, capable of filling the whole diameter of each tube. The whole of the furnace is opened with a long piece of iron fitted at the end of each pole, and the mould filled in an instant. This completes the work in relation to the casting part; the rest being the sculptor's or carver's business, who, taking the figure out of the mould, and earth, wherewith it is encompassed, saws off the jets with which it appears covered over, and repairs it with chissels, gravers, punches, &c.

3. *Foundry of bells.* The metal, it is to be observed, is different for bells, from what it is for statues; there being no tin in the statue-metal: but there is a fifth, and sometimes more, in the bell-metal. The dimensions of the core, and the wax, for bells, if a ring of bells especially, are not left to chance, but must be measured on a scale or diapason, which gives the height, aperture, and thickness necessary for the several tones required. It is on the wax that the several mouldings and other ornaments are formed to be represented in relievo, on the outside of the bell.

4. *Foundery of great guns and mortar pieces.* The method of casting these pieces is little different from that of bells: they are run massy, without any core, being determined by the hollow of the shell; and they are afterwards bored with a steel trepan, which is worked either by horses, or a water-mill.

5. *Letter foundery,* or *casting of printing letters.* The first thing requisite is to prepare good steel punches, on the face of which is drawn the exact shape of the letter with pen and ink, if the letter be large, or with a smooth blunted point of a needle, if small; and then,

with proper gravers, the cutter digs deep between the strokes, letting the marks stand on the punch; then files the outside, till it is fit for the matrice. They have a mould by which to justify or regulate the matrices, and which consists of an upper and under part, both which are alike, except the stool and spring behind, and a small roundish wire in the upper part, for making the nick in the shank of the letter. These two parts are exactly fitted into each other, to slide backward and forward. Then they justify the mould, by casting about twenty samples of letters, which are set in a composing-stick, with the nicks towards the right hand; and comparing these every way with the pattern-letters, set up in the same manner, they find the exact measure of the body to be cast. Next they prepare the matrice, which is of brass or copper, an inch and a half long, and of a proportionable thickness to the size of the letter it is to contain. In this metal is sunk the face of the letter, by striking the letter-punch the depth of an *n*. After this, the sides and face of the matrice are justified, and cleared, with files, of all bunchings that have been made by sinking the punch. Then it is brought to the furnace, which is built upright, of brick with square sides, and a stone at top, in which is a hole for the pan to stand in. They have several of these furnaces. The metal of which types are formed is lead, with a mixture of the regulus of antimony, or such other substance as the letter-founder approves. These being duly mixed and melted in a large cauldron of cast-iron, by continued stirring with an iron ladle, the workmen proceed to draw the metal off into small troughs of cast-iron, which are ranged to the number of four score, on a level platform faced with stone. In the course of a day, fifteen hundred weight of metal can be prepared in this manner.

The founder must now be provided with a ladle differing from other iron ladles only in its size, which is adapted to that of the letter he is to cast. Before he begins this operation, he must kindle the fire in his furnace to melt the metal in the pan. If it be a small-bodied letter, or a thin letter with great bodies, that

he intends to cast, his metal must be very hot, and sometimes red hot, to make the letter come. Then taking a ladle that will hold as much as will make the letter and break, he lies it at the hole where the flame bursts out to heat; then he ties a thin leather, cut with its narrow end against the face, to the leather groove of the matrice, by whipping a brown thread twice about the leather groove, and fastening the thread with a knot. Then he puts both pieces of the mould together, and the matrice into the matrice-cheek; and places the foot of the matrice on the stool of the mould, and the broad end of the leather on the wood of the upper haft of the mould, but not tight up, lest it hinder the foot of the matrice from sinking close down upon the stool, in a train of work. Afterward, laying a little rosin on the upper part of the mould, and having his casting-ladle hot, he, with the bolling side, melts the rosin and presses the broad end of the leather hard down on the wood, and so fastens it thereto. In the act of casting, placing the under half of the mould in his left hand, with the hook or jag forward, he holds the ends of its wood between the lower part of the ball of his thumb and his three hinder fingers; then he lays the upper half of the mould upon the under half; and, at the same time, the foot of the matrice places itself upon the stool, and clasping his left hand thumb strongly over the upper half, he nimbly catches hold of the bow or spring, with his right hand fingers at the top of it, and his thumb under it, and places the point of it against the middle of the notch in the reverse side of the matrice, pressing it forward as well toward the mould as downward, by the shoulder of the notch, close upon the stool, while at the same time, with his hinder fingers, he draws the under half of the mould toward the ball of his thumb, and thrusts, with the ball of his thumb, the upper part towards his fingers, that both the registers of the mould may press against both sides of the matrice, and his thumb and fingers press both sides of the mould close together. Then he takes the handle of his ladle in his right hand, and with the ball of it gives two or three strokes outwards

upon the surface of the melted metal, to clear it of the scum; then he takes up the ladle full, and having the mould in the left hand, turns his left side a little from the furnace, and brings the jet of his ladle to the mouth of the mould; and turns the upper part of his right hand towards him, to pour the metal into it, while, at the same instant, he puts the mould in his left hand forwards, to receive the metal with a strong shake, not only into the bodies of the mould, but, while the metal is yet hot, into the very face of the matrice, to receive its perfect form there as well as in the shank. Then he takes the upper half of the mould off, by placing his right thumb on the end of the wood next his left thumb, and his two middle fingers at the other end of the wood: he tosses the letter, break and all, upon a sheet of waste paper, laid on a bench, a little beyond his left hand; and then is ready to cast another letter, as before, and likewise the whole number in that matrice.

Then, boys, commonly employed for this purpose, separate the breaks from the shanks, and rub them on a stone, and afterwards a man cuts them all of an even height, which finishes the fount for the use of the printer. A workman will ordinarily cast 3000 of these letters in a day. The perfection of letters thus cast, consists in their being severally square and straight on every side; all of the same height, and evenly lined, without stooping one way or other; neither too big in the foot, nor the head; well grooved, so as the two extremes of the foot contain half the body of the letter; and well ground, barbed, and scraped, with a sensible notch.

Fount, or *font*, among printers (means a *found*, or *cast*), is a set or quantity of letters, and all the appendages belonging thereto, as numeral characters, quadrates, points, &c. cast by a letter-founder, and sorted.

Founts are large or small, according to the demand of the printer, who orders them by the hundred weight, or by sheets. When a printer orders *a fount of five hundred*, he means that the fount should weigh 500lb.

When he demands a fount of ten sheets, it is understood, that with that fount he shall be able to compose ten sheets, or twenty forms, without being obliged to distribute. The founder takes his measures accordingly; he reckons 120lb. for a sheet, including the quadrates, &c. or 60lb. for a form; which is only half a sheet: not that the sheet always weighs 120lb. or the form 60lb., on the contrary, it varies according to the size of the form; besides, it is always supposed that there are letters left in the cases. As therefore every sheet does not comprehend the same number of letters, nor the same sort of letters, we must observe, that, as in every language some sounds recur more frequently than others, some letters will be in much more use, and oftener repeated than others, and consequently their cells, or cases, should be better stored than those of the letters which do not recur so frequently: thus, a fount does not contain an equal number of *a* and *b*, or of *b* and *c*, &c. the letter-founders have therefore a list or tariff, or, as the French call it, a *police*, by which they regulate the proportions between the different sorts of characters that compose a fount; and it is evident that this tariff will vary in different languages, but will remain the same for all sorts of characters employed in the same language.

WONDERS IN THE HEAVENS.

The soul of man was made to walk the skies;
Delightful outlet of her prison here!
There, disencumber'd from her chains, the ties
Of toys terrestrial she can rove at large;
There, freely can respire, dilate, extend,
In full proportion let loose all her powers;
And undeluded, grasp at something great.

If we take the trouble to walk beyond the threshold of our own doors in a clear frosty evening, and turn our eyes to the starry firmament, we shall behold wonders above wonders, beyond the utmost stretch of

human thought to comprehend, and far, very far beyond the power of man to describe:—and these wonders, if considered a-right, cannot fail to produce the happiest effects.

Dr. Young says, in his Night Thoughts, "*An undevout astronomer is mad*," and he most assuredly is in the right; for what man, in possession of his faculties, can turn his eyes for a moment to the nocturnal heavens, and consider the tremendous span of that mighty arch which embraces the immensity of space—the ponderous and numerous orbs that glide along in silent majesty through those boundless fields of æther; and the exact regularity they have continued to maintain in their movements from the creation until now; without feeling his soul irresistibly drawn out, in adoration to the Almighty Creator of the Universe, and being completely overwhelmed with reverential awe, in the presence of that august being, who stretched out the heavens as a curtain, whose hand formed those glorious luminaries, and whose mighty arm preserves them in their being and motions.

What an enlarged and magnificent idea must we be led to entertain of the universe, when we reflect, that the more it is inquired into, the more unsearchable does it appear; and that, the utmost that can be said of its extent, is, that it is in every direction unlimited. We may travel far into the vast expanse by our natural powers of vision:—We can go a degree still farther, by the artificial help of the sight-invigorating tube, but our thoughts are bewildered and our conceptions lost, when we attempt to fathom this mighty sea without a shore, or to reach the margin of an expansion which knows no bounds. How wondrous then is that God, whose presence fills the immensity of space—who has peopled its desarts with so many huge automatons—who upholds them by his power—and confines and restrains them by his omnipotent mandate, to the various paths he has chalked out for them in the heavens.

Were we to behold one of the Andes, or the Alps, or even that comparatively smaller object, although it has been justly denominated "sea-rock immense," the

Bass, raised from its bed into the air, and there suspended, without any visible prop, made to revolve with considerable celerity, over a given space, in a certain time, with the greatest possible regularity, and always preserving an equidistance from the earth, would we not be struck with admiration at the magnitude of that force unseen, and the greatness of that power, which could at first accomplish, and afterwards prolong, for any length of time, such an event? But what are all the rocks and mountains in the world in comparison with those bulky and ponderous masses, which, supported by invisible agency, are made to roll in a medium far more rare than the atmosphere; and, yet, the amazing velocity with which they perform their several revolutions, have continued to circulate ever since the creation, with a steadiness and uniformity that is astonishing!

The planets, it is true, seem to take a considerable time in moving from one part of the heavens to another, and on this account, it may be supposed, that their motion being slow and deliberate, these bodies may be the more easily guided; but this is an illusion arising from distance; for it is a fact notorious, that the moon, slow as her progress from one star to another appears, drives incessantly in her orbit, with an impetuosity, exceeding two thousand miles an hour; being more than double the swiftness with which a ball is shot off from the mouth of a cannon!

The heavens indeed, in an emphatical manner, declare the glory of God, and, as if to leave those people in every nation without excuse, who act as insensible of the divine presence, their line is gone out through all the earth; there is no spot, however secluded, no desart, however remote, where this heavenly call to devotion is not heard.

"Has the Great Sovereign sent ten thousand worlds
To tell us, He resides above them all,
In glory's unapproachable recess?
And dare earth's bold inhabitants deny
The sumptuous, the magnificent embassy
A moments' audience!"

The brute indeed, as the poet expresses himself, "sees nought but spangles here;" but who, among the sons of reason,

> "Who turns his eye on Nature's midnight face,
> But must inquire—"What hand behind the scene,
> What arm almighty put these wheeling globes
> In motion, and wound up the vast machine?
> Who rounded in his palm these spacious orbs?
> Who bowl'd them flaming through the dark profound,
> Num'rous as glittering gems of morning dew,
> Or sparks from populous cities in a blaze,
> And set the bosom of Old Night on fire;
> Peopled her desart, and made horrors smile."

The Sun, whose powerful energies and renovating influence, makes creation rejoice in his presence. He, who is the parent of seasons, and occasions, as he shows or hides his face, the vicissitudes of day and night; although to our eyes, he may have now sunk beneath the shades of the horizon, and in midnight veiled his face. The Moon, which protracts and lengthens out the glories of the day, although painted in fainter hues, and lifts, and heaves old ocean on its bed. The various Planets in their orbits—Mercury, twinkling in his pure white lustre; Venus, brilliant in her varying phases; Mars, whose bloody tint gives way to the superior brightness of his poles; Ceres and Pallas, and Juno and Vesta, children but of yesterday, for the discovery of which we are indebted to modern astronomers; Jupiter, distinguished by his belts and spots; Saturn, encircled by his magnificent rings; the Georgium Sidus, the most remote of the planets yet discovered, with all the attendant Satellites that dance round them; Comets blazing in their eccentric orbits; Arcturus, Mazaroth, the Pleiades, and Orion, with all the host of fixed stars, visible or invisible to the naked eye, and whether reduced to constellations on our globes, or not, compose the actors in this great theatre of nature, and perform their various parts in the magnificent scene.

And can man witness, unmoved, a prospect so vast, and a spectacle so full of wonders?—No, it is impos-

sible?—Man returning from his labour in the evening, and taking even a momentary glance of these glories of Jehovah, must experience some of the sweet influences of pleiades; but far more sublime must be his conceptions of the Deity, who goes forth purposely to worship before him, and consider his works, in the temple of the universe.

> "A banquet this, where men and angels meet,
> Eat the same manna, mingle earth and heaven.
> ————Who can satiate sight
> In such a scene? In such an ocean wide,
> Of deep astonishment! where depth, height, breadth,
> Are lost in their extremes; and where, to count
> The thick sown glories in this field of fire,
> Perhaps a Seraph's computation fails.

A devout spirit: a soul filled with the most exalted conceptions of the Divine Being, is the undoubted consequence of contemplating such a scene as this; and if so, devotion must indeed be justly defined "The Daughter of Astronomy." What an incitement this to the young, to study this improving and delightful science, especially when it is considered, that Devotion is, in her turn, "The Mother of Virtue." From a devotion so inspired—

> "Rushes Omnipotence. To curb our pride,
> Our reason rouse, and lead it to that power
> Whose love lets down these silver chains of light
> To draw up man's ambition to Himself,
> And bend our chaste affections to His throne.
> Thus the three virtues, least alive on earth,
> And welcom'd on heaven's coast with most applause,
> An humble, pure, and heav'nly minded heart
> Are here inspir'd!
> — ——What call we then the firmament?
> As earth the body, since the skies sustain
> The soul with food, that gives immortal life,
> Call it "The noble pasture of the mind;"
> Which there expatiates, strengthens, and exults,
> And riots through the luxuries of thought.
> Call it "The garden of the Deity,"
> Blossom'd with stars, redundant in the growth
> Of fruit ambrosial; moral fruit to man.
> Call it "The breast-plate of the true High-priest,"

Ardent with gems oracular, that give,
In points of highest moment, night response;
And ill neglected, if we prize our peace.

————————Great objects make
Great minds, enlarging as their views enlarge,
Those still more godlike, as these more divine.
As man was made for glory and for bliss,
All littleness is an approach to woe.
What's vice?—Mere want of compass in our thoughts.
Now go Ambition! boast thy boundless might
In conquest o'er the tenth part of a grain!

How insignificant does the earth, with all her glories, appear, after the contemplation of a scene so rich and magnificent! It has been judiciously observed, that, "were the sun which enlightens this part of creation, with all the host of planetary worlds that move about him, utterly extinguished and annihilated, they would not be missed more than a grain of sand upon the sea-shore. The space they possess is so exceedingly little in comparison of the whole, that it would scarce make a blank in the creation. The chasm would be imperceptible to an eye, that could take in the whole compass of nature, and pass from one end of the creation to the other.

If the sun then, with the whole of the planetary system, is of so little account in the system of the universe, what are we to think of this globe that forms only a small part of it? and, if the earth itself dwindles into insignificance when compared with the whole extent of creation, in what estimation are we to hold those little allotments, and minute subdivisions, about which so much bustle is made by ambitious mortals? "What," says the pious Hervey, "are a few lordships, or the so much admired patrimonies of those who are styled wealthy? When I measure them with my own little pittance, they swell into proud and bloated dimensions. But when I take the universe for my standard, how scanty is their size, how contemptible their figure! They shrink into pompous nothings!"

WONDERS AT THE FIRESIDE.

Contrivance exquisite! expressed with ease,
Where unassisted sight no beauty sees;
The shapely limb, and lubricated joint,
Within the small dimensions of a point;
Muscle and nerve miraculously spun,
HIS mighty work, who speaks, and it is done;
THE INVISIBLE in things scarce seen reveal'd!
To whom an atom is an ample field! COWPER.

We have just remarked in our preceding article, that if any one will take the trouble to walk beyond the threshold of his own door in a clear frosty evening, and turn his eyes to the starry firmament, he will behold wonders above wonders, beyond the utmost stretch of human thought to comprehend, and far, very far, beyond the power of man to describe;" and we there said enough to illustrate and confirm this our observation—But such is the diffusive nature of creative wisdom—such the unlimited extent of the operations of Omnipotence, that

"Where'er we cast our eyes—to water, earth, or air,
God is in every place—his footsteps every where."

And it is even unnecessary to step beyond the amusements of the fireside, to be gratified with sights that must strike with admiration and overwhelm with sacred awe every person, who, with the help that modern discovery affords, will give himself the trouble, (we should rather say pleasure) attentively to consider the wondrous works of God in the minute objects of creation.

Nay, if the judgment of that profound philosopher, Mr. Robert Boyle, must be esteemed correct, when he said; "that his wonders dwelt not so much on Nature's clocks as her watches," we have reason to believe, that, with the help of a good microscope, we may be able to find more to excite our wonder and astonishment among the little, or almost invisibles, within doors, that we can possibly discover by the

magnifier among the celestial beauties of a cloudless sky.

The heavens, no doubt, in a very superior degree declare the glory of God, and blind and stupid must that mortal be, who can contemplate unmoved such a scene as is often presented on the azure canopy of the firmament—but

> "Mark'd by the magnifying crystal's aid
> In every place what proofs of skill's display'd!
> Search the least path creative power has trod,
> How plain the foot-steps of th' apparent God!
> His art could organs, strength, and sense implant
> In the small agile fly and reptile ant.
> In the mean mite, so much minuter still,
> Thy finger's pressing point may millions kill."

Take but a small portion of that white dust which has just fallen on the table from the cheese, place it at a convenient distance from the microscope, apply the eye, and what do you discover?—Don't start back with disgust from the strange looking objects! These lively active creatures that you now behold, rioting and tumbling over each other in such a frolicsome mood, and aping as it were the sportive gaiety of so many kittens, while their plump transparent bodies, beset with bristly hairs, their mole-like snouts and numerous legs, plainly designate them to be of a different species—are MITES! No other than mites, which in eating old cheese you make no scruple to swallow by hundreds, and which, you have hitherto been accustomed to view with marked indifference, as to consider them as the most insignificant objects in the creation, and but one remove from nothing. Yet see with what agility some of them move from place to place!—Behold how they ply their jointed limbs!—Observe with what impetuosity they bound in their gambols, and seem as zealously employed in their different pursuits as the crowded throng at a country fair, or the sons of Mars in the evolutions of a review; while others, removed at a convenient distance from the busy scene, seem munching and chewing the cud like so many guinea pigs.

Ought not these little insignificants, as you have erroneously been accustomed to consider them, truly to be reckoned amongst Nature's wonders?—And do not they become of magnified importance, in proportion as you are acquainted with their conformation and habits?—What then must be your conceptions of the WONDEREUL FORMER of these exquisite machines when you consider, that you have only as yet seen but a small part, or rather, but the outlines of these curious little structures;—that each individual of that numerous lively groupe you have just beheld with wonder and astonishment, must, as well as external, be in possession of a *complete set of internal organs*; —that, as well as a head and mouth, a body and legs, bristly hairs and pointed claws, there is not a mite in the creation of God, but must also, (in the words of an eminent naturalist,) have "a heart to be the fountain of life, muscles necessary to its motions, glands for the secretion of the fluids, a stomach and bowels to digest its food, besides other innumerable members, without which an animalcule cannot subsist. But since every one of these members is also an organic body, they must have likewise parts necessary to their action; for they consist of fibres, membranes, coats, veins, arteries, nerves, and an almost infinite number of fine tubes like those whose minuteness seem to exceed all efforts of imagination. But there are some parts that ought almost to be infinitely less than these, as the fluids that flow along these fine tubes, the blood, lymph and animal spirits, whose subtily, even in large animals, is incredible!"

Take now a small portion of that sediment of vinegar, and see what it will produce; for there are animalcules in fluids as well as in solids. You start back again! and cry out—It is full of *live ells*, or rather *little serpents*, whose rapidity of movements baffles all pursuit, and gives you no time to distinguish one from the other!—See with what brisk evolutions they dart from one extremity of the field to the other, mixing and turning, and crossing each other as they go along! You take your eye from the glass, and turn it to the

small speck, in the expectation no doubt of observing some motion where you have just had ocular demonstration so much exists, but now all is still and quiescent, —not a particle stirs,—the smallest agitation is not perceptible. You again have recourse to the glass, and all is bustle, tumult, and activity.

But here is a small *stripe* which we have just taken from the twig of a rose-bush, bring it under the magical operation of the glass, and say what are all these crystal-like appendages which give it the air and appearance of the exhibition in a glass-shop.—These are nothing more than the oozings of gum, in the variegated shapes they have congealed over the pores from which they had been drawn by the heat of the sun. You thought perhaps you could have here discovered a wood in miniature! and have been disappointed. But bring forward that little speck of mould! and we may yet contrive to gratify your curiosity.—A forest! a forest! you exclaim.—Yes, it is a forest, where not only the trees, but the branches, leaves, flowers and fruit, are visible!

Turn your glass now to the surface of your skin, and see how you are defended by Nature, from the injury of the air, by a scaly covering, resembling that of the inhabitants of the waters; and to the dust that adheres to the wing of a butterfly, and behold what a beautiful arrangement of feathers; and, to what you account of so little value, one of the hairs of your head, and see what a grand transparent tube, or viewed transversely, when cut in two, what a variety of vessels, in regular figures, encompassed with a rind or bark, it presents to your view.

But what, you enquire, are these two objects brought under review at the same time? This is the last exhibition we mean to present you with, and may be called the comparison; for, we mean to finish, by shewing the difference between the operations of nature and those of art; in the firm conviction, that you will need no greater stimulus to have low conceptions of yourself, and to dispose you to give God all the praise. One of these you will observe, is a long tapering sub-

stance, of an exquisite polish and gloss, terminating at the end with a point of inconceivable sharpness. The other object also appears to taper gradually, but you cannot fail to observe a rough unevenness on its surface, and an obtuseness at the point, which makes it appear very different from what it really is.—The former of these is a natural production, well known, being nothing more than the sting of a bee, the exquisite polish of which, no magnifier can remove, neither can the best glass rob it of its acuteness at the extremity. The latter is one of the nicest specimens of art, being the pointed end of a delicately formed and very fine needle!—A needle! you exclaim—this is impossible. As sharp as a needle! is a common expression, when we mean to denominate any thing remarkably so, but this has the appearance of a rough unseemly piece of iron, without either sharpness or polish. Examine it, however, and you will find that it is nothing more or less than what we have just asserted it to be, the pointed end of a very fine needle!

What do you now think of the work of man, when brought in competition with that of his Maker under the scrutinizing eye of the microscope? Does not the latter redound more to the praise and glory of HIM who made it, while the former, the more it is examined, the more it must be allowed to lose by the comparison.

Thus we see, that in the minuter as well as in the greater objects of creation, the inimitable attributes and perfections of the Deity conspicuously shine forth, and that any attempt to come up with them on the part of man, were he so foolish as to make the attempt, would only end in the more complete demonstration of the infinite superiority of his adorable Creator and of his own imbecility.

It is, indeed, in the words of Hume, a great mortification to the vanity of man, that his utmost art and industry can never equal the meanest of nature's productions either for beauty or value; but is, nevertheless, true, and such a knowledge is necessary to give us proper ideas and adequate conceptions of ourselves.

The most perfect works of art, if intimately examined betray a meanness, a poverty, an inability in the workman, but "the wonders of nature, the more they are searched into, the more perfect they do appear."

Whether then, as has been observed, with a Newton or a Herschel we take the telescope, and compare the stupendous magnitude and velocity of a planet, or with a Leewenhoeck or a Baker, survey, through a microscope, the structure and conformation of a mite, in each we are compelled to admire and adore the pervading wisdom and energy of the Creator:

> "Who gives its lustre to an insect's wing,
> And wheels his throne upon the rolling worlds!"

And in each, also, we are obliged, in humility to admit, the amazing difference between the operations of nature's God and the most curious and exquisite performances of man.

When the Psalmist, from a view of the nocturnal heavens, turned back his thoughts upon himself, it was indeed very natural for him to exclaim: "What is man that thou art mindful of him!' but the conclusion of the poet, after a microscopic survey of the sting of a hornet and the point of a needle, is no less just:

> "The microscopic glass admiring bring,
> And view the humble hornet's sharpen'd sting;
> Then on the slend'rest needle turn thy eye
> And the vast difference in their points descry:
> THIS view'd, more polish'd seems, acuter far;
> THAT, rough as from the forge some blunted bar.
>
> God's smallest work all human skill degrades,
> Foils the lost man, and sinks his worth in shades.

SINGULAR DEXTERITY OF A GOAT.

UPON our road (from Jerusalem to Bethlehem), says Dr. Clarke, in his Travels, we met an Arab with a goat, which he led about the country for exhibition,

in order to gain a livelihood for itself and its owner. He had taught this animal, while he accompanied its movements with a song, to mount upon little cylindrical blocks of wood, placed successively one above the other, and in shape resembling the dice-boxes belonging to a backgammon table. In this manner the goat stood, first upon the top of one cylinder, then upon the top of two, and afterwards of three, four, five, and six, until it remained balanced upon the top of them all, elevated several feet from the ground, and with its four feet collected upon a single point without throwing down the disjointed fabric upon which it stood. The practice is very ancient. It is also noticed by Sandys. Nothing can show more strikingly the tenacious footing possessed by this quadruped upon the jutty points and crags of rocks; and the circumstance of its ability to remain thus poised may render its appearance less surprising, as it is sometimes seen in the Alps, and in all mountainous countries, with hardly any place for its feet upon the sides, and by the brink of most tremendous precipices. The diameter of the upper cylinder, on which its feet ultimately remained until the Arab had ended his ditty, was only two inches; and the length of each cylinder was six inches. The most curious part of the performance occurred afterwards; for the Arab, to convince us of the animal's attention to the turn of the air, interrupted the *da capo;* as often as he did this, the goat tottered, appeared uneasy, and upon his becoming suddenly silent in the middle of the song, it fell to the ground.

THE SILK WORM.

The silk-worm is not originally a native of France, nor even of Europe, but the French breed and manage them very successfully in their southern provinces, and have brought their silk manufactures to great perfection. It was not till the year 555, that

two Greek monks, returning from the Indies to Constantinople, brought with them a number of these wonderful and profitable insects, with instructions for hatching their eggs, rearing and feeding the worms, drawing out the silk, &c. upon which manufactures were set up at Athens, Thebes, and Corinth. In the twelfth century, Roger, king of Sicily, established a manufactory at Palermo, and another in Calabria, having brought workmen from the cities of Greece, which he had conquered in his expedition to the Holy Land; and by degrees the rest of Italy, as well as Spain, learned the art from the Sicilians and Calabrians. In the reign of Henry II. the French began to imitate their neighbours, with good success; and king James I. was very desirous of having mulberry-trees planted, and silk-worms propagated in his British dominions, where, from various experiments, it appears they will thrive and work as well as in any other part of Europe.

This insect, from a small egg, about the size of a pin's head, becomes a large worm or maggot, of a whitish colour, inclining to yellow. In this state it feeds on mulberry leaves, till being come to maturity, it winds itself up in a silken bag or case, about the size of a pigeon's egg, and is metamorphosed into a crysalis. Thus it remains without any signs of life or motion, till at length it awakes to become a butterfly, after making itself a passage through its silken sepulchre. It dies at last, having, by its egg or seed, prepared itself for a new life, which the warmth of the ensuing summer enables it to resume.

There are two methods of bringing up these curious insects, either by letting them expatiate at full liberty on the mulberry trees that nourish them, as is practised in China and other hot countries; or else, as it is customary in Europe, by keeping them in rooms furnished for that purpose, with a sort of hurdles made of osier twigs, which are fixed in horizontal ranges one above another; and under every range there is a floor, which, like the bottom of a cage, may be drawn out at pleasure. Over these hurdles are strewed

mulberry leaves, upon which the insects feed; and they are supplied with fresh leaves every morning. The leaves should be gathered in a dry season, and kept in a place where no moisture can come. In fine weather fresh air should be let into the room from time to time, and great care taken to keep the place as neat as possible, particularly to cleanse the floors appointed to receive the fragments of their leaves and other impurities; for cleanliness and good air contribute greatly to their growth and welfare.

The worms are hatched in boxes lined with linen or paper, over which it is usual to spread some soft mulberry leaves; and from hence, when they have gained a little strength they are removed to the ranges of hurdles. When the silk-worm leaves its little egg, it is perfectly black, but its head is of a more shining sable than the body. In a few days it assumes a whitish hue, or an ash-grey; after which its coat sullies, and becomes ragged, at which time the animal casts it off, and appears in a new habit. As it increases in bulk, it grows whiter, but a little inclining to a green; till ceasing to feed, and sleeping for almost two days, it divests itself of its skin a second time, and appears in its third habit; its colour, head, and whole form, being so much changed, that one would almost suppose it to be another animal. It now begins to eat again, and continues to do so for some days, when it relapses into its former lethargy, at the conclusion of which it once more quits its covering; and having continued feeding some time longer, at length it renounces all feasting and society, and prepares for a retirement, by building itself a silken cell of admirable structure and beauty.

The beginning of this curious work looks like confusion, being only a sort of down or flue to keep off the rain, nature having ordained them to work upon trees in the open air, though we now bring them up in the house. This is the insect's first day's employment; on the second it forms its ball or cone, almost covering itself over with silk; and on the third day it is entirely hid, and the rest of the operation becomes

invisible; but it continues spinning for several days, till the cone is brought to perfection; and then folding itself in a sort of shell, formed of less delicate silk, intermixed with a gluttinous matter, it takes its repose. Having remained in this state fifteen days, or three weeks, and sometimes longer, it is transformed into a perfect butterfly, and forces its way out at the small end of the cone, which is neither so strongly cemented, nor so exactly closed as the rest of the covering.

Before the butterfly leaves its apartment, it frees itself of all that superfluous humidity which had been serviceable to it in its former state; by which evacuation, the silk is soiled and damaged, as well as by the opening the creature makes for its escape. To prevent this, the cones designed for use are exposed to the heat of the sun, or laid in an oven, by which means the insect is destroyed before it comes to the state of a butterfly; those only being permitted to arrive to that maturity, which are designed to lay eggs for a future stock of silk-worms; and a small number is sufficient for this purpose, since one female sometimes lays above five hundred eggs.

In order to wind off the silk, the down is cleared away in the first place, and the cones thrown into a copper of warm water, where they are stirred about with small twigs bound together, and cut like brushes; by which means the ends of the silk being disengaged are apt to catch on the twigs, and so are drawn out and fastened to the reel; eight, ten, or twelve of them being joined together, according as they would make a weaker or stronger thread. The workman then gives motion to the reel, guides his threads, substitutes new ones when any of them break, and strengthens them where necessary, by adding others, till the silk is exhausted. Then the cones, after opening them with scissars, and taking out the insects, are steeped three or four days in water; and being thus softened, and cleared of their gummy matter, they are boiled in a lye of ashes well strained, then washed in a river, and dried in the sun. Thus prepared, they are carded like wool, and yield a kind of

silken flax, which is spun with a wheel, and woven into stuffs of an inferior value.

Some who have considered attentively the fineness and length of the thread which the silk-worm spins, think they speak within compass, when they affirm, that each cone or ball contains silk enough to reach the length of six English miles. This however is certain, that an ingenious person having measured the silk drawn from one of these balls, it was found to measure above three hundred yards, and yet weighed but two grains and a half.

To these remarks concerning the silk-worm, it may not be improper to subjoin a short account of the silk of spiders, which the French have had the curiosity to manufacture into gloves and stockings. The discovery is owing to M. Bon, a member of the academy at Montpellier, who in the year 1710 published a dissertation on the subject, wherein he reduces all the different sorts of spiders to two principal kinds, viz. such as have long legs, and such as have short ones, which last are those that furnish the silk. These animals spin their silk out of the anus, around which are five papillæ, or small nipples, whereby the threads are formed, some weaker and some stronger, according to the use for which they are designed. The weaker sorts of threads are those which serve to make their webs, in which they catch flies; but they spin a much stronger kind, wherein they wrap up their eggs, and by that means preserve them from the cold, and from such insects as would destroy them. These threads they wind loosely round the eggs, resembling in shape the balls or bags of silk-worms that have been prepared and loosened for the distaff. Having collected twelve or thirteen ounces of these bags, M. Bon had them well beaten for some time with the hand and a small stick to get out the dust. He then washed them in warm water, changing it several times till they left the water very clean, and afterwards laid them to steep in a large vessel with soap, salt-petre, and gum arabic. Then letting the whole boil together two or three hours over a gentle fire, he washed them

again in warm water to free them from the soap, and laid them to dry some days to prepare them for carding, which was performed by the silk-carders, but with cards much finer than ordinary. By this means he had a silk of a particular ash-colour, which was easily spun, and the thread was stronger and finer than that of common silk. Of this he caused stockings and gloves to be manufactured, and found that three ounces of it would make a pair of stockings for the largest man, whereas those of common silk weigh seven or eight ounces.

The possibility of making this silk being shown, the only difficulty lies in procuring a sufficient quantity of spiders bags; which would be no difficulty at all, if we had the art of breeding them as they do silk-worms; for spiders multiply much more, and are not so subject to diseases. M. Bon, who kept a great number of young spiders in paper coffins and pots covered with paper pricked full of pin-holes to give them air, observed, that of seven or eight hundred scarcely one died in a year, whereas of a hundred silk-worms not forty lived to make their bags. This gentleman procured his spiders in the months of August and September, at which time their eggs are hatched, the old ones that laid them dying soon after.

From M. Bon's experiments it was at first supposed, that great advantage might have been made of these insects; but M. Reaumur, who was appointed by the Royal Academy of Sciences to make a farther enquiry into this new manufacture, gave no hopes of its ever turning to any account. The natural fierceness of the spiders, he observes, renders them unfit to be bred and kept together; for having distributed four or five thousand into different cells, fifty in some, a hundred or two in others, where they were fed with flies and the ends of young feathers, the large ones devoured the little ones, so that in a short time they were almost entirely destroyed: and to this inclination of devouring one another, we may in some measure ascribe the scarcity of spiders, considering the number of eggs they lay. It is therefore impossible

to establish these creatures into a community; and were it practicable, it would require too much room and application, because a much greater number of spiders than of silk-worms would be necessary to produce the same quantity of silk; besides that the spider's bag is inferior to that of the silk-worm both in lustre and strength. According to M. Reaumur's computation, two thousand three hundred and four worms will produce a pound of silk; and as he reckons the work of twelve spiders only equals that of one silk-worm, a pound of silk would require twenty-seven thousand, six hundred, and forty-eight spiders; nay, he supposes double the number must be ke kept for that end, as the bags are only spun by the females.

STONEHENGE.

Of those remains of antiquity, found in Great Britain, which are not generally ascribed to the Romans, the most curious is a pile of large stones on Salisbury Plain, about six miles from the city of Salisbury, called Stonehenge; the origin, structure, and use of which have occasioned many disputes among the learned.

The name Stonehenge, which is purely Saxon, and signifies nothing more than *hanging-stones*, probably alludes to the disposition of several parts of this wonderful fabric; but some authors have supposed the true name to be Stonehengist, and thence imagined this structure to have been erected in memory of Hengist the famous Saxon general; others have asserted that it is the tomb of Ambrosius Aurelianus, king of the Britons; and others have declared that it was raised by Ambrosius in memory of those Britons who were slain near this place by Hengist the Saxon. Some ingenious arguments have also been used to prove it is a temple of the Tuscan order built by the Romans; but most antiquaries have now agreed in the opinion of Dr. Stukely, that it was a temple of the

British Druids.* We shall therefore borrow a short account of it from the doctor's learned dissertation on this subject.

Stonehenge is situated on a rising ground, and makes a grand and awful appearance, especially as we approach it on the north-east, which side remains most perfect. It is encompassed by a circular ditch or trench, which having passed, we ascend thirty-five yards before we come at the work itself. The whole consists of four circles of stones, or rather two circles and two ovals, the outermost being about a hundred and eight feet in diameter. Of the outer circle, which originally consisted of sixty stones, that is, thirty uprights, and thirty imposts, there are seventeen uprights left standing, six of which have imposts upon them, and two more are still to be seen lying upon the ground, and also six more uprights. These stones are of a vast bulk, the uprights being fifteen feet high, exclusive of the imposts. The inner circle, which is about eight feet distant from the first, consisted of forty lesser stones which never had any imposts. They are flat parallelograms, like those of the outer circle; and nineteen of them are yet standing. They are about twenty inches thick, and four feet high, being just half as big as the uprights of the outer circle. The walk between these two circles, which is a hundred yards in circumference, must have been very delightful when this wonderful structure was entire.

* The Druids were the priests or ministers of religion among the ancient Britons, Gauls, and Germans; and being chosen out of the best families, the honors of their birth, together with those of their function, procured them the highest veneration. Nor had they only the administration of sacred things, but were the judges and arbiters of all affairs indifferently, both public and private, and being in the greatest esteem, the British and Gaulish youth flocked to them for instruction. The children of the nobility retired with them into caves and forests, where they sometimes lived twenty years under their tuition. They preserved the memory of the actions of great men in their verses, which they never allowed to be wrote down, but made their pupils learn by heart.

Within these circles are the two ovals, which are the principal part of the work, here being the adytum, or cell, into which we may suppose none but the higher order of druids were to enter. This is composed of what the doctor calls trilithons, each of which consists of two upright stones, supporting another laid across their heads and joined by mortises. Of these there are five remaining, three of which are entire, and two ruined in some measure, but the stones are still upon the spot. From the entrance into the adytum, these trilithons are placed two and two on each side, and one at the upper end, which was the highest, as the two first on the right and left were the lowest; but all the stones are of a surprising magnitude. The first trilithon on the right has suffered much, its impost and one of the uprights being tumbled down, and each broken into three pieces. The opposite trilithon on the left hand is standing, but very much decayed: the next to it is entire, as is likewise that facing it on the right, except that one end of the impost is fallen off, and its upper part is much impaired by the weather. The trilithon at the upper end, which stood beyond the altar, was the finest part of the whole work, the uprights having been above ten yards long, well chisselled, and justly proportioned in their dimensions. One of them stands entire, but leans against one of the stones of the inner oval; the other is broken asunder, and lies upon the altar, as does also the huge impost it once supported. This broken stone weighs above forty tons, and would require a hundred and forty oxen to draw it, and yet is not the heaviest stone in the pile. It is therefore amazing, not only how such massy loads were brought hither, from the distance of fifteen or sixteen miles, but to see so many of them placed together in a nice and critical figure, artfully joined by tenons and mortises, and a geometrical proportion observed through the whole structure. How the builders could move such prodigious stones as these, which they have fixed as it were in sockets dug in the chalk, and rammed in

like posts, without more irregularity in their height and distance, is altogether inexplicable.

The inner oval consists of smaller stones, which rose gradually in height from the entrance to the upper end of the adytum. There are only six of these remaining upright, with the stumps of three or four more, and several lying on the ground. The stone which our author supposes to have been the altar, is of a different kind from the rest, resembling the blue coarse marble that is brought from Derbyshire, and frequently used for tomb-stones. It is twenty inches thick, and about twice as broad; but its length is not easily ascertained, it being broken into several pieces, and almost sunk into the ground by the weight of the ruins falling upon it, particularly the impost, and one of the uprights of the great trilithon above mentioned. The heads of oxen, deer, and other beasts, the undoubted relics of sacrifices, which have been found upon digging in and about this place, are a confirmation that Stonehenge was originally a pagan temple.

All the rising grounds about Stonehenge, for several miles round, are covered with barrows, or monuments of earth, thrown up in form of a bell, and surrounded with little ditches, from which circumstance, some have concluded, that great battles have been fought upon the plain, and that the bodies of the slain were there interred; but it is more reasonable to suppose that they are no other than family burying-places, which are situated near this temple, for the same reason that the moderns bury in church-yards and consecrated ground: for it is observable, that all the barrows, even those at the greatest distance, are within view of Stonehenge.

In the year 1722, a barrow was opened in the presence of lord Pembroke, and in the centre of it, about three feet under the surface, was found a perfect skeleton, the head lying north towards Stonehenge. The year following, by his lordship's order, Dr. Stukely opened another, and found an urn of unbaked clay, containing a heap of burnt bones, intermixed with beads of various shapes and colours. A collar-bone,

and one side of an under-jaw remained very entire; from the size of which, and from the female trinkets deposited in the urn, it was conjectured to have been a young woman of fourteen or fifteen years of age, who had carried arms, as the British virgins used to, the brass head of her javelin being found amongst the remains. In other barrows were found human bones, together with those of horses, deer, dogs, and other animals.

Dr. Stukely supposes, that Stonehenge was built soon after Cambyses invaded Egypt, and by his outrages forced the priests and inhabitants in general to disperse themselves into all parts of the world. Some of these, he imagines, came into Britain, and introduced part of their learning, arts, and religion, among the Druids, and probably had a hand in this very fabric, the stones being wrought with a tool, whereas all the other works of the Druids consisted of rude stones, after the patriarchal and Jewish mode. At that time the Phœnician trade was at its height, whose vessels might convey the Egyptians to this island; which makes our author's conjecture the more probable. What might possibly have cleared up these uncertainties, was a tablet of tin, with an inscription upon it, found at Stonehenge in the reign of king Henry VIII. But as the characters were not understood by the persons consulted on that occasion, the plate was either destroyed or lost.

THE SEA SNAKE.

Perhaps the most wonderful and terrible animal in nature is a sea monster, called the Great Sea Snake, or the Serpent of the Ocean, which, though seldom seen, sometimes visits the coast of Norway, and keeps continually at the bottom of the sea, except in the months of July and August, which is its spawning time; and then it comes to the surface in calm wea-

ther, but plunges into the water so soon as the wind raises the least wave.

According to the best accounts which Bishop Pontoppidan could gather concerning this monster, it will, at times, rear so much of its body out of the water, that its head will reach much higher than the main-top of any ship; and it will spout water out of its mouth like a whale: the form of it is that of a snake, the body is covered with scales, and the skin is uneven and wrinkled: it has two flaps, or perhaps broad fins, under its body, and is supposed to be 600 feet in length. It lies on the surface of the water in many folds; and there generally are, in a line with the head, some small parts of the back to be seen above the surface of the water, when it moves or bends; and these at some distance, appear like so many casks, or hogsheads, floating in a line, with a considerable distance between each of them; the eyes are very large, of a blue colour, and look like two large pewter plates. The whole animal is of a dark brown colour, but variegated with light streaks or spots, that shine like a tortoise-shell. It has a kind of a mane, which looks like a parcel of sea weeds, hanging down to the water edge; and, in its progress, it throws the water in such agitation, that it runs round it like the current of a mill. It is said, that this monster will sometimes raise up its head, and snap a man out of a boat; and it is affirmed, that it has been known to rear part of its body out of the water and throw it across a vessel of some hundred tons, and by its weight, sunk it down to the bottom.

THE POISON TREE OF NORTH AMERICA.

A VERY remarkable vegetable of North America, is the Poison-Wood-Tree, which grows in New England, in swamps or low wet grounds, and is described by Mr. Dudley as somewhat like a small ash, but much more like a sumach, which it exactly resembles

in its twigs, leaves, and shape, so that some call it the Swamp-Sumach; and it likewise bears a dry berry. It never grows bigger than about the thickness of a man's leg, and as tall as an alder; but it spreads much, and several grow together, especially about the roots of one that has been cut down. The inside of the wood is yellow, and very full of juice, which is as glutinous as honey or turpentine, and stinks as bad as carrion; and the wood itself has a very strong disagreeable smell. As to its poisonous quality, our author observes, that it poisons two ways, either by the touch or by the smell; the scent of it, when cut down in the woods, or burning in the fire, being poisonous to a great degree. One of Mr. Dudley's neighbours was blind for above a week with only handling it; and a gentleman sitting by his fire-side in the winter, was swelled for several days with the smoke of some of this wood that happened to be in the fire. But what is strange, it has this effect only on some particular persons and constitutions, for Mr. Dudley has seen his own brother not only handle it, but chew it without any harm at all; and so by the same fire, one shall be poisoned, and another not in the least affected. However, this sort of poison is never mortal, but will go off in a few days of itself; though generally the patient applies plantain-water, or sallad oil and cream. A few hours after a person is poisoned, he feels an itching pain that provokes a scratching, which is followed by an inflammation and swelling.

The wood is as cold as ice, as Mr. Dudley's neighbour that was poisoned told him, so that he plainly perceived it differed from the other wood he was throwing up into his cart; and he assured him he could distinguish it blindfold, or in the dark, from any other wood in the world by its coldness.

THE FECUNDITY OF PLANTS.

The fecundity of divers plants is very surprising. We have an account in the Philosophical Transactions of a single plant of barley, that by steeping and watering it with salt-petre dissolved in water, produced two hundred and forty-nine stalks, and eighteen thousand grains. In this case indeed there was art and force made use of; but we have remarkable instances of this kind, effected by unassisted nature, particularly that of a pompion-seed, attested by Mr. Edwards of Windsor. This seed, in the year 1669, was accidentally dropped in a small pasture, where cattle had been foddering for some time; and taking root of itself, without any manner of care, the vine ran along over several fences, and spread over a large piece of ground far and wide, continuing its progress till it was killed by the frost. The seed produced no more than one stalk, but it was a very large one, being eight inches round; and from this single vine they gathered two hundred and fifty pompions, one with another as big as half a peck, besides a considerable number of small ones, not ripe, which they left upon the vine. Add to this what M. Dodart observes, who has an express discourse on the fecundity of plants, in the Memoirs of the Academy of Sciences, wherein he shews, that an elm, at a moderate computation, yields one year with another 329,000 grains or seeds; each of which, if properly lodged, would grow up to a tree. Now an elm ordinarily lives a hundred years, and consequently, in the course of its life, produces near thirty-three millions of grains, all coming originally from one single seed.

THE BEAVER.

The Beaver abounds more in Canada than in any other part of the world. There are many surprising

particulars related of this animal. In the memoirs of the Royal Academy of Sciences there is an extract of a letter from M. Sarrasin, formerly the French king's physician in Canada, concerning the dissection of a beaver. He says the largest are three or four feet long, and about twelve or fifteen inches broad in the chest and haunches; that they commonly weigh about fifty pounds; and that they usually live to the age of twenty years: but Francus says, they live thirty or forty years, and that he had heard of a tame one being kept seventy-eight years. Dr. Sarrasin says farther, that a great way north the beavers are very black, though there are some white; but those of Canada are commonly brown, and their colour grows lighter as they are found in more southern countries.

These creatures observe a wonderful polity, and their manner of living and building their habitations shows an extraordinary instinct implanted in them by the great Author of nature. In order to raise themselves a convenient abode, they chuse a low level ground, watered with a small rivulet, where, by making dams across it, they can form a reservoir of water and overflow the ground. These dams or causeys are formed by thrusting stakes five or six feet long and as thick as a man's arm, deep into the earth: and these they wattle across with tender pliable boughs, and fill up the spaces with clay, making a slope on the side against which the water presses, and leaving the other perpendicular. One of these dikes may be ten or twelve feet thick at the foundation, and they raise it in height proportionably to the water's elevation. As they are sensible that materials for building are not so easily transported by land as by water, they take the opportunity of swimming, whenever they can, with clay placed on their tails, and stakes of wood between their teeth, to every place where those materials are wanted. If the violence of the water, or the footsteps of the hunters who pass over the work, should damage it in any degree, they immediately visit all the edifice, and with indefatigable application, repair and adjust whatever they find out of

order; but, if they are too frequently disturbed by the hunters, they only work in the night, or else discontinue their labours.

When the beavers have completed their causey or dike, they begin to form their cells, which are round or oval apartments, divided into three partitions or stories, raised one above another. The first is sunk below the level of the dike, and is generally full of water; the other two are formed above it. The walls of these houses are upright, and about two feet thick; and they are always built in stories, that in case the water rises, the beavers may retire to a higher situation. The materials are the same as they use for the dike: and, as their teeth supply the place of saws, they cut off all projections that shoot out from the stakes beyond the perpendicular of the wall; after which they work up a mixture of clay and dry grass into a kind of mortar, and by means of their tails lay it over the building both within and without. They likewise drive stakes into the earth to fortify the structure against the winds and water; and at the bottom they strike out two openings to the stream, one of which leads to the place where they bathe, and the other is a passage to that quarter where they carry out every thing that would rot or defile the upper apartments. There is a third aperture much higher, calculated to prevent their being shut up when the ice has closed the openings into the lower lodgments.

The dimensions of these houses are proportioned to the number of the intended inhabitants, twelve feet in length and ten in breadth being found sufficient for eight or ten beavers: and, if the number increases, they enlarge the building accordingly. It has been asserted, that there have been found above four hundred of these creatures in different apartments communicating with one another; but these populous societies are very rare, because they are too unmanageable, and the beavers are generally better acquainted with their own interests. They associate to the num-

ber of ten or twelve, and sometimes a few more, and so pass the winter together in a very agreeable manner.

There are some beavers called terriers, which burrow in the earth, beginning their hole at such a depth under water as they are sensible it will not freeze at; and this they carry on for five or six feet, just large enough for them to creep through. Then they make a bathing-place three or four feet square, from whence they continue the burrow, always ascending by stories, that they may lodge dry as the water rises. Some of these burrows have been found to be a hundred feet in length. This is Dr. Sarrasin's account of the terriers, but others say they begin their burrow on the land, and having dug downwards to a proper depth, they then dig horizontally till they come to the water.

The beavers of Canada have generally completed all their works in August or September, after which they furnish themselves with provisions for the winter. During the summer they regale themselves with all the fruits, plants, and roots, the country produces; but against winter they lay up a stock of wood, which they feed upon after steeping it in water, and this in quantities proportionable to their necessary consumption. They gnaw off twigs and branches from the trees, of which the large ones are conveyed to the magazine by several beavers, and the smaller by a single one; and it is observed that they take different ways, each having his walk assigned him, that they may not interrupt one another in their labour. The dimensions of their pile of wood are regulated in proportion to their numbers, and we are told that one of twenty-five or thirty feet square, and eight or ten feet high, is the usual provision for eight or ten beavers. When the wood is soaked in water, they gnaw it into small pieces, and convey it to their cells, where it is regularly divided amongst them. Sometimes they wander about in the woods, and regale themselves and their young with a fresh collation: for they love green wood better than that which is old and withered: and the hunters, sensible of this, place a parcel of the former about their habitations, and then have several

devices to ensnare them. When the winter is severe, and the water frozen over, the hunters sometimes break the ice; and, when the beavers come to the opening for the benefit of the fresh air, they kill them with hatchets; or else they cover the aperture with a strong net, and then overturn their lodge, upon which the poor animals, thinking to escape by betaking themselves to the water, and emerging at the hole in the ice, fall into the snare and are taken. Many other things are related concerning the sagacity and industry of these creatures, the strength and beauty of their little cities, of the wars which one canton wages against another, and of their putting the most laborious part of their work upon those they take prisoners, &c.

ORIGIN OF IMPORTANT DISCOVERIES.

GLASS.

It is certain, says Pliny, that the most valuable discoveries have found their origin in the most trivial accidents. "As some merchants were carrying nitre, they stopped near a river which issues from Mount Carmel, and not happening to find stones for the purpose of resting their kettles upon, they substituted in their place some pieces of the nitre, which the fire gradually dissolving, mixed with the sand, and occasioned a transparent matter to flow, which, in fact, was nothing else but glass."

BARK.

An Indian, in a delirious fever, having been left by his companions by the side of a river, for the purpose of quenching his thirst, conceiving him incurable, drank large and copious draughts of the stream, which, having imbibed the virtues of the bark from the trees which grew upon its margin, soon vanquished the fever, and he returned to his astonished friends perfectly restored.

The singularity of the circumstance excited their surprise, and waked their superstition; the indisposed crowded round the holy stream, as they termed it, and experienced its healing effects, without being able to discover the cause from which it was derived. The sages of the tribes, however, found out, at length, in what it consisted, and disclosed the important secret. In the year 1640, the Americans became acquainted with the use of this excellent medicine; and, in 1649, its fame had extended into Spain, Italy, and Rome, through the representation of cardinal Lugo, and other jesuits, who had beheld its surprising and wonderful effects.

TELESCOPES.

It is said that the use of telescopes was first discovered by one Hansen, a spectacle-maker, at Middleburgh, in Holland, whose children, playing in the shop, casually placed a convex and concave glass in such a manner, that, by looking through them at the weather-cock, they observed it appeared much larger and nearer than usual, and, by their expressions of surprise, excited the attention of their father, who soon obtained great credit for this useful discovery.

COFFEE.

A prior belonging to a monastery in that part of Arabia, where this berry grows in the greatest abundance, having observed that the goats which ate it, became extremely brisk and alert, resolved to try the experiment upon his monks, of whom he continually complained for their lethargic propensities. The experiment proved successful, and it is said, that it is owing to this circumstance, that the use of this Arabian berry became universal.

STEERING SHIPS.

Heylin, in his Cosmography, tells us that the art of steering was discovered by a man of the name of Typhis, who took his hints for making both the rudder

and helm, from seeing a kite, in flying, guide her whole body by her tail.

THE PURPLE DYE.

The purple dye was found out at Tyre, by the simple circumstance of a dog seizing the fish conchilis or purpura, by which his lips were observed to be tinged with that beautiful colour.

THE PENDULUM.

It is said, that Galileo accidentally fixing his eyes on the waving to and fro of a lamp suspended from the roof of a lofty building, had the first idea of a pendulum suggested to his mind.

NUTMEG, CINNAMON, & CLOVE TREES.

It is the Indian islands that furnish us with nutmegs, cinnamon, cloves, &c. which spices are justly esteemed for their salutary heat and aromatic odour, and seem in the first place to deserve our attention. A vulgar error long prevailed, and is perhaps still entertained by some people, that nutmegs, mace, cloves, and cinnamon, were all produced by one and the same tree; but this is contradicted by all our latest and best accounts, the opinion being only true with respect to mace and nutmegs. The nutmeg-tree grows spontaneously in the Banda islands, and especially in that which particularly bears the name of Banda, formerly possessed by the English, but now by the Dutch, who have monopolized the spice trade to themselves. And such prodigious quantities of nutmegs are produced in these islands, that we are credibly informed the Dutch sometimes burn vast heaps of them upon the spot, rather than bring them to Europe, and overstock the markets.

But to proceed with our account of the tree that bears these aromatic nuts, it is as large as our common pear-trees, and its leaves like those of the peach-tree,

but somewhat rounder. The fruit is about the size of a small peach, consisting first of a soft juicy hull, like that of a walnut, and immediately underneath it lies a thin reddish coat called mace, and by some, though improperly, the flower of nutmeg. This incloses a hard woody shell, and opens in proportion with the outward hull. The shell is blackish; under which is a green film of no use, and in this is found the nutmeg. We are told that this fruit is gathered three times a year, viz. in April, August, and December; but the best are those gathered in April. They must be chosen heavy, of a whitish-brown colour, well marbled on the outside, reddish within, having an agreeable smell, and a fat unctuous moisture. It is to be observed farther, that there are two kinds of nutmegs, male and female; the latter of which is chiefly used amongst us, the male being a wild nut of a longish form, without either smell or taste.

The nutmeg-tree is propagated after a particular manner, according to Tavernier's account, who relates, that when the fruit is ripe, certain birds devour it whole, but are forced to throw it up again before it be digested, and that the nutmeg, thus besmeared with a viscous matter, takes root where it falls, and produces a tree, which would never thrive was it planted. Thevenot says, that the birds having picked off the green husk, swallow the nuts, which after some time they void in the ordinary way undigested; adding, that they are shaped like a cuckow, and that the Dutch prohibit the killing of them under pain of death. Mr. Ray tells us, that several sorts of birds devour the nutmegs, but chiefly a small white kind of pigeons; and that being voided whole, they take root the sooner, as having been previously macerated in the stomach of the animal. He adds, however, that the fruit of the trees produced in this manner is much worse than that of others, and that the natives take no notice of it except for the mace, which they use to adulterate that which is better.

The clove-tree was formerly very common in most of the Molucca islands, and all nations furnished them-

selves with cloves at liberty; but the Dutch, to render themselves sole masters of that merchandize, have found means to destroy all the clove-trees, except those of Ternate, and a few other small islands in their own possession. The fruit of this tree falling on the ground, takes root, and thus it is multiplied without any culture. The tree resembles a laurel, but its leaves are narrower; and it is said that no grass will grow under its branches, its own root attracting all the humidity of the soil. From the age of eight years to a hundred it bears fruit, which is gathered once a year; though some say they crop the buds one year, to make them thrive the better next; and so gather the fruit only every second year. When the clove first begins to appear, it is of a whitish-green colour, but grows brown as it ripens; nor is there any preparation necessary in order to render it such as it comes to us, but to dry it in the sun, notwithstanding what some authors talk of steeping it in sea-water to preserve it from worms. Towards the head it separates into four parts, whose apices meeting at the top, form a kind of crown, somewhat in the antique manner.

The fine spice we call cinnamon, is the bark of a tree growing plentifully in Ceylon, and perhaps peculiar to that island; at least the best sort is brought from thence, and the commerce thereof monopolized, like the other spices, by the Dutch East India Company. By an account given us in the Philosophical Transactions, there appears to be several species of the cinnamon-tree, though some are not easily distinguished from each other. That which yields the true and best cinnamon, has leaves like those of the lemon-tree, bears white fragrant blossoms, and a yellowish fruit, not unlike an acorn, which has neither the smell nor taste of the bark, but yields, when boiled, an oily juice, that hardens and becomes like tallow, and is not only used by the Ceylonese both internally and externally for several disorders, but also for candles, which is said are only allowed to be burnt in the king's palace. The young leaves of this tree are red, and if rubbed between the hands, yield an odour more like that of

cloves than of cinnamon. These, by distillation, afford an oil of a bitterish taste, resembling oil of cloves, to which a little oil of cinnamon has been added. This is called *Oleum Malabathri*, and is celebrated as an instantaneous remedy for pains of the head and stomach, and some other disorders.

The inhabitants of this island extract from the root of the cinnamon-tree, by incision, a liquor that smells like camphire, and gradually coagulates into white grains. This species of camphire is also obtained by distillation from the bark of the root dried, bruised, and immersed in water. The physicians of Ceylon use this distilled camphirated liquor with success, exhibiting a spoonful of it at proper intervals, as a sudorific, in continual and malignant fevers.

The cinnamon-tree must grow a certain number of years before the bark is fit to be taken off; but the best sort ripens two or three years sooner than the other trees, which is owing to the difference of the soil they grow in. Those, for instance, where the soil is a fine white sand, will be ready in five years time, whereas those that stand in a wet slimy soil must have seven or eight years before they are ripe enough. Those trees likewise that grow in the shade of others, whereby the sun is kept from their roots, are later on that account; and for the same reason the bark of such trees has not that agreeable taste, which is observed in those that grow in a white sandy soil, where, with a little wet, they stand exposed to the sun. It is rather of a bitterish taste, somewhat astringent, and smells like camphire; for, by the heat of the sun the camphire is rendered so thin and volatile, that it rises up and mixes with the juices of the tree, where it undergoes a small fermentation; and then rising still higher between the substance of the wood and the thin inner membrane of the bark, it is at last so effectually diffused through the branches and leaves, that the least trace of it is not to be perceived. Mean time the thin glutinous membrane between the bark and the substance of the wood attracts the purest, sweetest, and most agreeable particles of the juice, leaving the thick

and gross ones, which are pushed forwards, and serve to nourish the branches, leaves, and fruit.

To confirm the truth of what has been said, our author observes, that if the bark be fresh taken off, the juice remaining in the tree has a bitterish taste, not unlike that of cloves; but, on the contrary, if you taste the inner membrane of the bark, when just taken off, you will find it most exquisitely sweet and pleasant, whereas, the outer part of the bark differs very little in taste from that of the common trees, which shews that all its sweetness is owing to the inner membrane. When the bark is laid in the sun in order to be dried and convolved, this oily sweetness of the inner membrane diffuses itself through the outer part of it, which has been stripped, while still upon the tree, of its outermost greenish coat, and impregnates it so strongly, as to make it a commodity which is coveted and admired by all the world for its aromatic taste and fragrancy.

The cinnamon may be taken from trees that have stood fourteen, fifteen, or sixteen years after coming to maturity; but then they begin to lose their agreeable sweetness, and the bark has more of the taste of camphire; besides, it is then grown so thick, that when it is laid in the sun, it does not shrink and wind itself up, but remains flat. And now our author thinks it worth enquiring, considering the vast quantities of cinnamon that have been exported from the island of Ceylon, how such numbers of trees fit to be barked still remain; for it is absolutely false, that when the bark has been stripped from the tree it grows again in four or five years, as some have reported. The truth of the matter is, that after the trees have been barked, new shoots arise from the roots, which in six or seven years are fit to be barked; and hence it appears how instrumental the old roots are to the plenty and growth of cinnamon. The tree is propagated by the fall of the fruit, and its being scattered by a sort of wild pigeons, as we have observed of the nutmegs. These birds, when they fetch food for their young ones, disperse the fruit over several parts of the island, which occasions the rise of many thousands of young trees, which

grow on the sides of the roads, and form woods and groves in several places.

In the shops, that cinnamon is generally accounted best that is of a yellowish-red externally, and internally of a somewhat darker colour; and it is to be chosen smooth, easily broken, of a fragrant scent, and pungent taste. That which is small is preferable to the large kind, and the long pipes are more valuable than the short ones. It is sometimes adulterated with the bark of the caper-bush, tamarisk, or the cassia lignea; but this piece of fraud is easily detected. As to its virtues, though it be an excellent cordial, and highly beneficial in palpitations of the heart, yet by being too often used it has been found to bring on the same disorder; in which case acids are the most effectual means of relief.

To the account we have given of the cinnamon-tree, we shall only add, that the cassia lignea just mentioned, is a species of it produced in Malabar, Java, Sumatra, and the Philippine Islands, and is brought into Europe in small pipes like the Ceylonian cinnamon, but is of a darker and more rusty colour, of a more complete texture, and more languid smell. That sort of this bark is reckoned best which is of a purplish colour, easily broken, fragrant, and of a sweetish taste, because then it abounds with a volatile oleous salt, sheathed in a mucilaginous substance, and is therefore proper when the intention is only moderately to heat, open, resolve, and strengthen.

Having mentioned that camphire is obtained from the root of the cinnamon-tree, it is proper to observe, that it does not come from that tree only, but from another which grows very frequent in the island of Borneo. It is a substance of a very singular nature, distilling from the tree in manner of a gum, and thickening into little grains of different figures and sizes. It is white, transparent, friable, of an acrid and somewhat bitterish taste, of a penetrating smell, and to some people greatly offensive. We are told that camphire is red at first, but whitened either by the sun or by fire; and indeed we have very little of the raw na-

tural camphire among us, the Dutch taking care it shall come refined by sublimation, and prepared to our hands.

INNS IN EASTERN COUNTRIES.

To give the reader some idea of the Caravansera's, or inns of Persia, and other eastern countries, it may not be amiss to describe the royal one at Cashan, which, according to Sir John Chardin, is the fairest, not only in that city, but in the whole Persian empire. It is a square building, every side of the court or area within being two hundred geometrical paces. It has two stories, with a sort of antichamber below, that runs the whole length of two of the fronts, railed about the height of a man above the court, and four inches lower than the level of the chamber. The second story is contrived like that below, with a balustrade four feet high, that lets in the light, and runs round the structure. The entrance is under a high and magnificent portal, adorned with mosaic work, as is the rest of the building; and in the middle of the court there is a fine fountain. The hinder part of this caravansera consists of large stables, rooms for servants and luggage, store-houses, and lodgings for the poor, and for the country people who bring their goods to market; and behind all there are large gardens. The founder of this magnificent caravansera was Abas the Great, and adjoining to it stands the royal palace, and another designed for the lodging of embassadors, both erected at the expence of the same monarch.

It is to be observed, that most of the caravanseras in the cities of Persia and Turkey are built in this quadrangular form, having galleries running round them, into which the chambers open, like many of our great inns in England. In one respect they resemble monasteries, for they have a little mosque belonging to them, and the apartments are like the cells in the dormitories of religious houses. When a merchant

arrives at one of these caravanseras, he has nothing to do but apply to the director or intendant of the house, who will assign him a lodging and a warehouse for his goods, upon paying a small piece of money at his entrance, and two-pence or three-pence a day afterwards. As to provisions, candles, fuel, and other necessaries, they are brought to the caravansera, and sold at an easy rate.

But the caravanseras built on the roads are somewhat different from those in the cities. These are often erected in dry, barren, desart places, and some of them are furnished with water from a great distance, and at a vast expence, there being no caravansera without its well or cistern. As they are designed for the reception of companies of merchants travelling together, with their camels, mules, merchandize, &c. they are always large buildings, long or square, having the appearance of a barn, without any distinct rooms or partitions.

THE TORPEDO.

Of all the productions of Africa, perhaps none more deserves the attention of the curious than the torpedo. Some of the natives having got a net, Mr. Moore went along with them to fish in a lake over-against one of the factories, where they caught a great number of fish; and amongst the rest, one something like a gudgeon, but much larger. None of them cared to touch it, and persuaded our author not to come near it, telling him it would kill him. Some of them got long sticks, and touched the fish with them; but finding the effect not so bad as they apprehended, they cut the sticks shorter and shorter, and even at six inches length the fish had no effect. At last they ventured to touch it with their fingers, but could not bear it the twentieth part of a minute. By this time Mr. Moore understood it was a torpedo, or numb-fish, and had the curiosity to touch it with one of his fingers; but

in a moment his arm was dead quite up to his elbow, which came to itself again as soon as he withdrew his hand from the fish. He repeated the experiment several times, and found it have the same effect, even after the fish was dead. He then ordered the fish to be skinned, and found that the benumbing quality lay in the skin only, which it entirely lost when dried.

This is the plain matter of fact, as Mr. Moore has related it; but as it is one of the most curious subjects in all natural history, we think it will not be disagreeable to enquire into the cause of such a wonderful effect. But let us first observe, that whereas Mr. Moore represents the torpedo to be like a gudgeon, other authors speak of it as a flat fish, much of the figure of a thornback, found commonly enough about the coasts of Provence, Gascony, &c. and eaten by the people of those countries. And whether the surprising quality of the fish lies in its skin, as our author supposes, let the reader judge, after he has considered the following hypotheses.

There are different ways of accounting for the effect produced by touching the torpedo. The first is that of the ancients, who contented themselves with ascribing a torporific virtue or faculty to the animal, which is just the same as saying nothing at all. The second supposes the effect to depend on an infinite number of corpuscles issuing continually from the fish, but more copiously under some circumstances than others. This is the opinion most generally received, being adopted by Redi, Perrault, and Lorenzini, who thus explain themselves: as the fire emits a quantity of corpuscles proper to heat us, so the torpedo emits a number of corpuscles fit to numb the part they insinuate themselves into, whether it be by entering in too great abundance, or by their falling into tracts or passages disproportionate to their figures. The third account is that of Borelli, who looks upon this emission of corpuscles as imaginary, and says, that the fish, upon being touched, puts itself into a violent tremor or agitation, which occasions a painful numbness in the hand that touches it: but M. Reaumur, whose

hypothesis is the last and justest, could never observe any such trembling, notwithstanding he viewed the fish with great attention when ready to strike the numbness.

This gentleman observes, that the torpedo, like other flat fishes, is not absolutely flat, but its back, or rather all the upper part of its body, a little convex. Now M. Reaumur always found, that when the fish did not, or would not, produce any numbness in the person who touched it, its back preserved its natural convexity; but whenever it would dispose itself to resent a touch or thrust, it gradually diminished the convexity of its back parts, rendering them quite flat, and sometimes even concave. The very moment after this disposition the numbness seizes the arm, the fingers that touched are obliged to withdraw, and all the flat and concave part of the body is again seen convex: and whereas it becomes flat so gradually as to be perceived, the return to its convexity is so swift, that it is absolutely imperceptible. It is from this sudden stroke, according to M. Reaumur, that the numbness of the arm arises; for the person, when he begins to feel it, imagines that his fingers have been violently struck. The wonder is, how so soft a substance as that of the fish, can give so rude a blow; and indeed a single stroke of a soft body could never do it, but in this case there is an infinity of such strokes given in an instant. To understand this, we must consider the mechanism of the parts whereon it depends, which are two very singular muscles, described by several authors. They are shaped like a half-moon, and both together take up almost half the back of the fish, the one on the right side, the other on the left. Their origin is a little above the mouth, and they are separated from each other by the bronchia, into the last of which they are inserted. But what is singular in them is their fibres, if we may give that name to a sort of smaller muscles as big as goose-quills, of an assemblage whereof the two great muscles are formed. These lesser muscles are hollow cylinders, their length nearly equal to the thickness of the fish, and ranged

perpendicular to its upper and lower surfaces, accounting those surfaces as nearly parallel planes. These again are composed of twenty-five or thirty smaller cylinders placed over each other, and each full of a medullary substance.

Now we need only remember, that when the torpedo is ready to strike its numbness, it slowly flattens the surface of its upper part; and the whole mechanism, whereon its force depends, will be apparent. By that gradual contraction it bends, as it were, all its springs, renders its cylinders shorter, and at the same time augments their bases; and in all probability too, the large fibres, or little muscles, at that instant lose their cylindrical form, to fill the vacuities between them. The contraction being made, the longitudinal fibres are lengthened, the transverse ones are shortened, and the soft matter they inclose is driven upwards, which is promoted by an undulatory motion apparent in the fibres when contracting. The parts of the torpedo being thus disposed, a finger that touches it, instantly receives a stroke, or rather several successive strokes, from each of the cylinders to which it is applied. As the soft matter is distributed into divers inclosures, it is more than probable that all the strokes are not given precisely at the same moment; nor indeed would they be so if there were no inclosures at all, but they serve however to augment the number of the springs, and consequently the velocity and force of the action. These quick reiterated strokes shake the nerves, and suspend or change the course of the animal spirits; or they produce a motion in the fibres of the nerves, which clashes or disagrees with that they should have in order to move the arm, and occasions a painful sensation. Hence it is that the torpedo does not convey its numbness to any considerable degree, except when touched on these great muscles; so that the fish may be safely taken by the tail, which is the part by which the fishermen catch it.

As the torpedo lives on other fishes, it is probable that its benumbing faculty is of use to it in catching them; and this is the opinion of Pliny, Aristotle, and

many other naturalists. M. Reaumur had no fish alive, to try whether the torpedo would kill them; but having shut up a drake in water with the fish for some time, the drake was taken out dead, doubtless from its too frequent contacts with the torpedo. But what is still more strange than the torpedo's killing of fishes, the History of Abyssinia speaks of its bringing dead ones to life again, they being seen to stir if put together in the same vessel. What is related in the same history is much more credible, viz. that the Abyssinians use the torpedo for the cure of fevers, by tying the patient to a table, and applying the fish successively to all his members, which puts him to great pain, but effectually carries off the disease. Bellonius assures us, that the torpedo applied to the soles of the feet, has proved successful against fevers; and Dr. James says, it mitigates the violence of the pain in an inveterate head-ache: but we suppose such instances very rarely occur.

INSTANCES OF BODILY STRENGTH.

The prodigious strength of Bussiqua, made Milon cry out, "Jupiter, have you then made another Hercules." This Bussiqua lifted a stone which Milon could scarcely move: he carried it to a considerable distance, and threw it from him with the greatest ease. This same Bussiqua laid hold of a bull with one hand, in the middle of his course, and held him fast, in spite of his greatest efforts to disengage himself; nay, he even seized another bull who was passing by accident at that time, and held them both at the same time.

Peter of Portugal lifted with his right hand a sack of wheat, and put it upon his left shoulder; then he put upon his right shoulder another sack full of wheat with his left hand. One day a lad of twenty-five years of age presented himself at court, saying he could show the king something extraordinary with respect to strength. He obtained permission to appear before

the king. That youth having ordered three sacks of wheat to be brought, did with the two first what the king had done; he then took a third sack into his teeth, and threw it above that which he had on his left shoulder. This surprised all the spectators, and astonished the prince, who could not enough admire the force and address of this youth. They say the prince in vain attempted to imitate him. This youth exceeded the other Portuguese of his time in stature; he was hard and thin, and was a great eater. What was still more extraordinary, this youth could hold fast a chariot drawn by six horses or cattle, in spite of their utmost efforts to go on. The name of this youth is not preserved upon record; it is only known that he was a native of the village of Freixo; which made him be called Menino de Freixo.

THE MOLE AND WORM.

By an Observer.

All animals are endowed by nature with an instinctive fear of danger, and powers, in most cases, by which they are enabled to distinguish their enemies, and in some measure to evade the pursuit of those who seek to devour them. The oyster, on any prospect of danger, shuts its shell; the snail and the tortoise retreat within the hard coat that covers them; the hedge-hog rolls itself into a ball; the chicken, on the first appearance of the kite, is agitated with the most violent alarm, and flies to its mother for protection; and the hare, on the first appearance of a dog, betakes itself to flight, and exerts its utmost powers to elude its ravenous pursuer. This is a general law of nature; and it extends, as I have reason to believe, to animals of a lower class than we are accustomed to imagine. The mole, it is well known, feeds upon the common earth-worm; but I believe it is not generally known, that in the dark regions it inhabits, it is en-

dowed with faculties for distinguishing its prey at some distance, and far less, that the reptile it is in search of can distinguish its approaching danger, and try to elude it. Yet, from some facts that have fallen under my own observation, there seems to be no doubt of this circumstance, and that in consequence of it, the mole, in the bowels of the earth, chaces its prey with the same avidity as the lion, or the wolf, or the bear, upon its surface; and that the worm flies with the same degree of eagerness from its greedy pursuer, as the stag in the forest, or the hare among the stubble.

One damp cloudy day, as I was standing in the garden, contemplating some of the beautiful productions of the vegetable tribe, I saw the earth near me begin to be heaved up by the working of a mole, and immediately directed my attention to that object. I could soon perceive that the mole was working with an unusual degree of agility, which still more commanded my attention. It was not long before I perceived the head of an earth-worm penetrate the mould with a surprising degree of rapidity—nearly half its body came above the earth at the first push, and at the second, it freed itself from the mould entirely, and ran off along the surface with a degree of agility I never had seen this animal exert till then. The mole too pursued still; but on coming very near the surface, immediately desisted, and retired, as I supposed, disappointed, from the chace: my imagination at least made me conclude this was the case. I leave the reader to draw what conclusions he thinks natural from this fact.

Having had my attention thus awakened with regard to this phenomenon, I have been, since that time, on the watch, in similar cases, to see if I could observe the like, and had one opportunity of observing a similar mole-chace at a further period. I state these facts, of the exactitude of which I am certain, that your readers may take notice if any of them ever remarked any of the same kind. Whether the inference I draw from it be just or not, I leave every one to judge for

himself: But if it should be admitted that the mole can thus pursue its prey at a distance, we should be forced, I think, to conclude, that it distinguishes its tract by the scent, like a spaniel or hound; but by what means the worm should be made sensible of its danger, it is perhaps impossible to divine.

N. B. In both the instances I observed, the worm that made its escape was of a bright, lively, red colour, more so than is common among this class of reptiles. Whether this could be ascribed to the ardour of the chace, or whether it was only accidental, I cannot pretend to say, as in both cases I allowed the worm to make its escape without detaining it for future observation.

THE MUSICAL PIGEON.

As related by Mrs. Piozzi.

An odd thing to which I was this morning witness, has called my thoughts away to a curious train of reflections upon the animal race; and how far they may be made companionable and intelligent. The famous Ferdinand Bertoni, so well known in London by his long residence among us, and from the undisputed merit of his compositions, now inhabits this his native city, and being fond of dumb creatures, as we call them, took to petting a pigeon, one of the few animals that can live at Venice, where, as I observed, scarcely any quadrupeds can be admitted, or would exist with any degree of comfort to themselves. This creature has, however, by keeping his master company, I trust, obtained so perfect an ear and taste for music, that no one who sees his behaviour, can doubt for a moment of the pleasure he takes in hearing Mr. Bertoni play and sing: for as soon as he sits down to the instrument, Columbo begins shaking his wings, perches on the piano-forte, and expresses the most indubitable emotions of delight. If, however, he or any one else

strike a note false, or make any discord upon the keys, the dove never fails to shew evident tokens of anger and distress; and if teazed too long, grows quite enraged; pecking the offender's legs and fingers in such a manner, as to leave nothing less doubtful than the sincerity of his resentment. Signora Cecilia Giuliani, a scholar of Bertoni's, who has received some overtures from the London theatre lately, will, if she ever arrives there, bear testimony to the truth of an assertion very difficult to believe, and to which I should hardly myself give credit, were I not witness to it every morning that I chuse to call and confirm my own belief. A friend present protested he should feel afraid to touch the harpsichord before so nice a critic; and though we all laughed at the assertion, Bertoni declared he never knew the bird's judgment fail; and that he often kept him out of the room, for fear of his affronting or tormenting those who came to take musical instructions. With regard to the other actions of life, I saw nothing particular in the pigeon, but his tameness, and strong attachment to his master: for though never winged, and only clipped a very little, he never seeks to range away from the house, or quit his master's service, any more than the dove of Anacreon:

> While his better lot bestows
> Sweet repast and soft repose;
> And when feast and frolic tire,
> Drops asleep upon his lyre.

FRESH AND SALT LAKE OF MEXICO.

THERE is no lake in the world, we know of, like this: a part of its water is fresh, and the other salt; which gives room to think that there are two sources, though but one lake appears.

The fresh water seems stagnant and motionless, and the salt water ebbs and flows as the sea, with this difference, that it does not follow the rule of tides, being

only produced by the blowing of winds, which sometimes makes this lake as tempestuous as the sea.

If the salt water comes from the same source as the fresh, it is probable, that its saltness is occasioned by the earth, which lies under the water in that part, being impregnated with salt; for great quantities of salt are there made, and it is an article of considerable commerce for the city with the most distant provinces.

The fresh water of this lake is good and wholesome, and affords plenty of small fish; it is higher than the salt water, and falls into it; the part of the lake that ebbs and flows is brackish, and has no sort of fish.

The salt lake is seven leagues in length, as many in breadth, and upwards of twenty-two in circumference; the lake of fresh water is much the same; so that the whole lake is about fifty leagues in circumference.

A TERRIBLE SEA-MONSTER.

A FISHERMAN being out in a little vessel near Trepani, unfortunately fell overboard, and was instantly snapt up by a monster resembling a large sea-dog, in sight of several other fishermen, who then made to shore with all speed, lest the monster should take a fancy to make a dinner of them next: but as soon as they had recovered from this panic, they considered the damage the monster might do their fishery, and being likewise desirous to revenge the death of their comrade, they got divers iron instruments made, to which they fixed large steel hooks, and then went out in their boats in quest of the monster, which had appeared several times before near that shore. Having found him on the 6th of November, they baited their hooks with pieces of horse-flesh; but this device did not succeed; the monster kept aloof, as if he suspected their design: wherefore they threw out a noose with a bait suspended in the middle of it, two or three men holding each end of the cord. This stratagem succeeded; the monster leapt at the bait so vigorously,

that its whole head got through the noose, and the fishermen instantly pulling the rope, dragged it to shore. It was twenty palms in length, and its mouth excessively large, with three rows of teeth in the upper jaw; and the tail was six palms in length: the belly was not proportionate to the rest of the body, being only fourteen palms in circumference. It was a female, and weighed upwards of 4000lb. The next day the fishermen cut it up, and found in it a great quantity of fish, one half of a man's skull with the hair on, as also two legs, part of the back-bone, and the ribs, which they judged to be those of their unfortunate comrade, that was devoured a few days before. They afterwards burnt this monster, lest it should infect the air.

It appears from Pliny and other authors, that sea-monsters of this kind were known to the ancients by the name of Canis Carcharias.

A CURIOUS ACCOUNT OF A WILD MAN.

The following relation, concerning a wild man, though but little known, is well authenticated. The account is translated from a work published at Paris, by M. Le Roy.

"In the year 1774, a savage, or wild man, was discovered by the shepherds, who fed their flocks in the neighbourhood of the forest of Yuary. This man, who inhabited the rocks that lay near the forest, was very tall, covered with hair, like a bear, nimble as the Hisars, of a gay humour, and, in all appearance of a mild character, as he neither did, nor seemed to intend, harm to any body. He often visited the cottages, without ever attempting to carry off any thing. He had no knowledge of bread, milk, or cheese. His greatest amusement was to see the sheep running, and to scatter them, and he testified his pleasure at this sight by loud fits of laughter, but never attempted to hurt those innocent animals. When the shepherds

(as was frequently the case) let loose their dogs after him, he fled with the swiftness of an arrow shot from a bow, and never allowed the dogs to come too near him. One morning he came to the cottage of some workmen, and one of them endeavoured to get near him, and catch him by the leg, he laughed heartily, and then made his escape. He seemed to be about thirty years of age. As the forest in question is very extensive, and has a communication with vast woods that belong to the Spanish territory, it is natural to suppose that this solitary, but cheerful creature, had been lost in his infancy, and had subsisted on herbs.

THE TARANTULA.

The Tarantula, a venomous kind of spider, is found chiefly in Naples, near the city of Taranto, from whence the insect derives its name. The tarantula is about the size of a large nutmeg, furnished with eight feet, and as many eyes; it is hairy, and of various colours. From its mouth arise two horns, or trunks, formed a little crooked, with the points exceeding sharp, through which it conveys its poison. These horns are in continual motion, especially when the animal is seeking for food; whence it is conjectured, that they are a kind of moveable nostrils. Tarantulas are also found in several other parts of Italy; but those of Apulia, in which the city of Taranto stands, are the only kind that are reckoned dangerous, and that chiefly in the heat of summer. The bite or sting of this insect occasions a pain like that felt on the stinging of a bee or an ant; and in a few hours a livid circle appears about the part affected, which is followed by a painful swelling. Soon after this the afflicted person falls into a profound sadness, breathes with difficulty, and at length loses all sense and motion. Some people who are wounded express great satisfaction at the sight of particular colours, and display a strange aversion to others. Tremblings, anger, fear, laughter, weeping,

absence, talk, and action, are also symptoms attending persons bit by the tarantula, who infallibly die in a few days, unless proper means are used to expel the poison. All the assistance that medicine has yet discovered, consists in some external applications on the wound, in cordials and sudorifics. But these are of little efficacy, music being the great and only remedy. As soon as the patient has lost his sense and motion, a musician is sent for, who tries several tunes on an instrument, till he hits on that which is most agreeable to the disordered person. This is known by his first moving his fingers, then his arms, afterwards his legs, and by degrees his whole body, till at length he rises on his feet and begins to dance, which he continues for several hours. After this he is put to bed, and when he is judged to have sufficiently recruited his whole strength, the musician calls him out of bed by the same tune, to take a second dance. This exercise is repeated for four or five days, till the patient grows weary and unable to dance any longer, which is a sign of his being cured. When he comes to himself, he is like one awaked out of a profound sleep, not having the least recollection of his dancing, or of any thing that passed during the time of his disorder. If the cure be not completely effected, the patient continues melancholy, shuns company, and perhaps drowns himself, if he has an opportunity. Some have had regular returns of their fits every twelve months, for a great many years successively, at which times they are treated in the manner already described, finding no relief from any thing but music and dancing.

Dr. Mead, in his curious treatise on the effects of the bite of the tarantula, supposes the malignity of the poison of this animal, to consist in its great force and energy, whereby it immediately raises an extraordinary fermentation in the whole arterial fluid. As to the tarantuti (or those bit by the tarantula) he says, the benefit of music arises not only from their dancing to it, and so evacuating by sweat, a great part of the poison; but the percussions and vibrations of the air break the cohesion of the parts of the blood, and pre-

vent coagulation; so that the heat being removed by sweating, and the coagulation by the contraction of the muscular fibrillæ, the wounded person is restored to his former condition.

THE SURPRISING CUPRESSUS DISTICHIA.

THE cupressus distichia stands in the first order of North American trees. Its majestic stature is surprising; and on approaching it, we are struck with a kind of awe, at beholding the stateliness of the trunk, lifting its cumbrous top towards the skies, and casting a wide shade upon the ground, as a dark intervening cloud, which, for a time, excludes the rays of the sun. The delicacy of its colour and texture of its leaves, exceed every thing of the kind in vegetation. It generally grows in the water, or in low flat lands, near the banks of great rivers and lakes, that are covered with two or three feet depth of water; and that part of the trunk which is subject to be under water, and four or five feet higher up, is greatly enlarged by prodigious buttresses, or pilasters, which, in full grown trees, project out on every side to such a distance, that several men might easily hide themselves in the hollows between. Each pilaster terminates underground, in a very large, strong, and serpentine root, which strikes off and branches every way, just under the surface of the earth: and from these roots grow woody cones, called cypress knees, four, five, and six feet high, and from six to eighteen inches and two feet in diameter at their bases. The large ones are hollow, and serve very well for bee-hives; a small space of the tree itself is hollow, nearly as high as the buttresses already mentioned. From this place, the tree, as it were, takes another beginning, forming a grand straight column, eighty or ninety feet high, when it divides every way around into an extensive flat horizontal top, like an umbrella, where eagles have their secure nests, and cranes and storks their temporary

resting places; and what adds to the magnificence of their appearance, is the streamers of long moss that hang from their lofty limbs and float in the winds. This is their majestic appearance when standing alone, in large rice plantations, or thinly planted on the banks of great rivers.

Paroquets are commonly seen hovering on their tops: they delight to shell the balls, its seed being their favourite food. The trunks of these trees when hollowed out, make large and durable pettiaugers and canoes, and afford excellent shingles, boards, and other timber, adapted to every purpose in frame buildings. When the planters fell these mighty trees, they raise a stage round them, as high as to reach above the buttresses; on this stage, eight or ten negroes ascend with their axes, and fall to work round its trunk. The trunks of these trees sometimes measure eight, ten, and twelve feet in diameter, for forty and fifty feet straight shaft.

THE HUMMING BIRD.

The humming bird is to be met with in no country but America, and may be looked upon as one of nature's master-pieces, not only on account of its beauty, but of its manner of life, and the minuteness of its parts: though the dimensions of it do not exceed the bulk of a large fly, yet the plumage of it strikes the eye in the most agreeable manner, and glows with all the colours of the rainbow. His neck is dyed with such a blushing red, that it is frequently mistaken for a ruby. The belly, and down beneath the wings, are as yellow as gold, and its green thighs surpass the emerald: its feet and bill have as fine a gloss, and are as black as ebony: its eyes appear like two oval diamonds, resembling in colour, the most polished steel; and its head a lively green, with an intermixture of gold, the lustre whereof is beyond expression. The males have a little tuft or tossel on their heads, in

which all the beauteous colours that shine so conspicuous throughout the whole, are assembled and concentered. These birds fly with such a velocity, that one may more properly be said to hear, than see them. Their principal sustenance is, as we are informed, the dews and juices of the most fragrant flowers. These they extract with their little tongues, which are much longer than their bills. This little instrument performs the office of a trunk, which they contract at pleasure, and infold within their beaks, as in a case or scabbard. This beak, though no larger than a fine needle, renders them formidable even to the large birds there, called grosbegs, who make it their business to devour the young of the humming bird in their nest: if, however, their dam, who is a little heroine, happens to spy one of these cowardly invaders, he flies before her, and cries with all his might, as dreading to feel the weight of her just resentment. The humming bird closely pursues him; and if she once overtakes him, lays fast hold of him with her little talons, under his wing, and wounds him with her pointed beak to that degree, that he is obliged to decline the combat, and submit to her superior power.

ANTIQUITIES NEAR NAPLES.

By Captain Sutherland.

We lost no time in seeing the wonders of this extraordinary country. Our first object was to follow Æneas to the Cuman shore; and on our way thither, it was but just to pay our oblations at Virgil's tomb. This celebrated monument is close to the top of the grotto of Pausilippe, on the left of the eastern entrance. The inside is a square of twelve feet, with three niches for urns on the east and west sides, two niches and a door, through which you enter on the south, and the same on the north. The roof is arched, and about nine feet high. The outside was originally octagonal:

but the angles being worn away, it is now circular, and at a distance, looks like the remains of a small tower. The materials are of the common kind, and we did not observe any marble near it, except two modern inscriptions.

Formerly, the tomb was surrounded with laurels, but as every idle visitor took a leaf, there is not a sprig left. We could not help exclaiming against such sacrilege, but our Cicerone endeavoured to comfort us, by saying, that the Marquis Salcitro had ordered a new set to be planted.

The grotto of Pausilippe is at the west end of the suburbs of Naples. It is a public road cut through the mountain, near half a mile in length, and wide enough for two carriages to drive abreast. Its height is very irregular, in some parts eighty feet, and at others only five and twenty. In the day time you may see from the one end to the other, by the help of two large apertures, cut diagonally from the centre of the grotto to the surface of the mount; but, at night, we were obliged to use torches, which, when any number of vehicles are driving together, have a most beautiful effect. The bottom, like all Naples, is paved with square pieces of lava.—Its exact date has not been ascertained. The common people insist that it was done by enchantment; as a proof of which they alledge, that no stones were found near the entrance. It would be to no purpose to tell them, that those who perforated the mount very naturally made use of the stone in building the town.

But after all, the difficulty in accomplishing this passage was by no means so great as one would at first imagine; for the stone is so soft, that until it has been for some time exposed to the air, you may crumble it to dust. Neither, in my opinion, is this celebrated excavation equal to the batteries, magazines, and communications, formed in the solid rock of Gibraltar, by Mr. Inch, under the direction of general Eliott, and continued with astonishing success by major general O'Hara.

After passing the grotto, we drove to Puzzoli. The

road is remarkably pleasant, great part of it running between groves of poplars, planted in regular order, to sustain the vines in the style of our hop-gardens. The vines are loaded with grapes, and, encircling the trees, form a variety of beautiful festoons from one tree to another, in every direction. The ground beneath, is either covered with grass, or laid out for corn.

Turning a little out of the way to the right, we came to Lago D'Agnano, formerly a volcano, now a romantic, beautiful lake. Close to it is a little cave called Grotto del Cane, from a vapour that rises in it so obnoxious to dogs that it kills them in a few minutes; and doubtless it would have the same effect on man, or any other animal, whose head was held near the ground.

Between Lago D'Agnano and Puzzoli, on the side of another extinguished volcano, called the Solfaterra, we saw the Piscattelli, or boiling springs, of whose wonderful effect, in turning lava and pumice stone into clay and into soil, I had, the same evening, the satisfaction of hearing a philosophical account from Sir William Hamilton, with which he has already favoured the public.

We hired a boat at Puzzoli; and after rowing about two miles across part of the celebrated Bay of Baia, with Virgil in my pocket, landed close to the Lucrine Lake, at the foot of Monte Nuovo. This mountain, which is several hundred yards in height, and above a mile in circumference, was thrown up by the Lucrine Lake, in a violent earthquake in the year 1538. However strange this may appear, such phenomena are by no means uncommon in Italy. The lake was of course much reduced by this eruption, and now only covers three or four acres. It is about ten yards from the sea, and has a sluice to communicate with it.

After a short walk in a pleasant vineyard, we entered the Sybil's Cave, a road cut through a mountain in the style of the grotto of Pausilippe, but on a smaller scale. The passage from the cave to her palace, is only wide enough for one person. After descending

ten or twelve yards, we came to her baths, four small chambers with water still in them.—We were carried through on men's backs, with candles in our hands, and ascending a little on the opposite side, came to the door of her palace, but it was so choaked up with rubbish, that we were obliged to return without finding an entrance; and passing through her cave and a wild shrubbery on the west of it, we arrived at Lake Avernus, and on the opposite banks saw a grove where Æneas was to find the golden bough.

The lake seems to have lost the noxious qualities which Virgil ascribed to it; but this I imagine, is owing to most of the high trees, with which it was closely surrounded, being cut down, and little but brushwood left. The temple is at a small distance on the right of the lake; we wished to go to it, but our Cicerone persuaded us that it would be better to delay seeing that and the entrance into hell, until we had been at Cuma.

We therefore repassed the Sybil's Cave, and returning to the Lucrine Lake, again embarked, and proceeded along the shore to the foot of Nero's palace, where the sand under the sea-water is so hot, that we could scarcely touch it. The effect of subterraneous fire.

The baths are above. These are several large chambers, divided into different apartments for the men and women, with two subterranean passages leading to the water, which unite at the distance of two hundred yards from the spring. Here the heat is so excessive and insupportable, that it is supposed no longer necessary to continue the separate passages, since, even should persons of different sexes advance thus far, there is no danger of their being noticed by each other, for to get here cost us great pain; and all our clothes, in a few seconds, were wet through with perspiration.

This is what they call bathing, for nobody can bear the water. One of our guides, for a pecuniary reward, brought a little in a bucket, and boiled some eggs in it, which were afterwards served at our table in a

shady spot, on the adjoining classic ground; and we crowned this grateful repast with the health of a favourite fair, in a smiling bumper of real Falernian, from the very vineyards which have been celebrated by Horace. The wine was remarkably good, and the charming toast, gave it a still higher flavour. I am convinced that it would have found its way to England, had not the Italians lost the art of preserving it. One must therefore either drink it new, or sour.

About two miles from Nero's baths, we were shewn the temple of Diana, a large dome, one half of which was destroyed by an earthquake, the other remains. The temple of Mercury is on the opposite side of a modern bridge. The dome is still entire, and is seventy feet in diameter. It has a similar effect to the whispering gallery at St. Paul's. Part of the roof is lined with common mosaic. The walls of the different out-offices are still standing, and the court has been lately planted with lemon and orange trees, which in time, will add greatly to the beauty of its appearance. This spot seems to have been particularly sacred, for, not an hundred yards further, is a large octagon tower, the remains of a temple of Venus Genetrix, but no other vestige of it is left.

Here we again embarked, and after rowing some little way along the shore, landed and walked to the top of a hill, from which we had a view of the Elysian Fields, and of Lake Acheron below us. The lake is changed, like Avernus, but the Elysian Fields are still a beautiful wilderness. On our way, we passed several ancient burying places, and a variety of other ruins—ruins in the truest sense of the word, for the whole is an heap of rubbish.

A little way beyond this, is the famous reservoir constructed for the use of the Roman navy. The roof is supported by forty-eight square pillars, with a proportionable number of arches, something in the style of the Nun's Cistern at Gibraltar, but on a scale so much more grand, that it would contain above an hundred times the quantity of water.

From this reservoir, we proceeded through a vine-

yard, to an amazing subterraneous building, supposed to have been Nero's prisons. The gallery is about twelve feet high, and nine wide. We were told that it proceeds in a right line from the entrance to the sea, and is divided into nearly an hundred apartments; but as it is full of stones, and as the air is said to be extremely hurtful, we could not prevail on our guide to descend to any distance in this direction; but turning to the left, we entered a range of apartments in the form of a cross, which we supposed were for the officers, as the partition walls are only carried to within two feet of the arch. In the inmost, fourteen bronze lamps were found. The niches in which they stood, still remain. On striking the ground, it returned a hollow sound, as if there was a range of prisons beneath.

As soon as we returned to day-light, we descended to the sea-side, to the tomb of Agrippina. It is an arched vault, fifteen feet long, and nine wide, almost filled up with rubbish. The walls are covered with elegant basso relievo miniature figures, in a small square, remarkably neat and beautiful; one represents a female deity, with extended wings, soaring in the air; two others are women, reclining on a couch, but so choaked up with smoke and soot from the torches, that it is impossible to determine who they are: the workmanship, however, one easily perceives, exhibits the hand of a capital master, who has displayed so much taste, beauty, and harmony, that we are almost tempted to forget Agrippina's crimes; and, in pitying her fate, we redouble our horror at the inhuman paracide who sent her to her tomb.

It is not known by whom this monument was erected; and I think it not improbable, that it might have been ordered by Nero himself, since he is reported to have said, that had he known how beautiful his mother was, he never would have destroyed her.

Having now seen every thing on the coast of Baia, we returned to Puzzoli, and to our inexpressible concern, found it was too late to continue our excursion to Cuma.

Puzzoli abounds with antiquities; but the temple of Jupiter Serapis is the only one we had time to see. This was one of the most noble structures yet brought to light; and we can never sufficiently lament, that it has not been preserved in the state in which it was found.

The court is a square of one hundred and twenty feet, and was surrounded by a magnificent colonnade, which, together with the roof and pavement, were of beautiful marble. It contained many elegant statues, and every other religious ornament; but the king was seized with such an avidity for these treasures, that he had them all removed to his different palaces, with the exception of four columns only, which are left, as a sample, before the entrance of the inner temple, each eighteen feet in circumference, and forty in height. The temple itself was again stopped up with rubbish, after all its ornaments were taken away.

In the centre of the court, an altar was raised for sacrifice; but as it was composed of the finest materials, it was crushed by the earthquake that buried the temple. The base still remains, with the ring to which the victim was tied, and the vessels for holding its blood.

WONDERFUL THINGS PRODUCED BY ART.

The Silver Sphere, a most noble and ingenious performance, which was presented by his Imperial Majesty Ferdinand, to Sultan Solyman, the magnificent, is mentioned by Paulus Jovius, and Sabellicus, as shewing and keeping time with the motions of celestial bodies in their various configurations. It was carried to Constantinople, in several parts, by twelve men, and there put together by the artist that made it, in the Grand Signior's presence, who also shewed him the mysterious use of it.

Praxiteles, a famous carver in imagery, born in

Magna Græcia, in the utmost confines of Italy, and from thence brought to Rome, employed his art to the admiration of all men. He made a statue of Venus for the Gnidians, so exquisitely, that a young man fell in love with it, and in his amorous passion, lost first his wits, and then his life. This curious piece was so highly valued by King Nicodes, that the Gnidians being indebted to him in a vast sum of money, he freely offered to accept that statue in full payment of his debt; but they were too fond of their goddess to part with her ladyship at any rate.

Cornelius van Drebble, that excellent artificer, made an instrument like an organ, that being set in the open air, under a warm sun, would make fine music of itself, without the keys being touched by an organist, but would make no symphony in the shade; for which reason, the curious concluded, that it was inclosed air, rarified by the strictures of the radiant sun, that caused the harmony.

A famous mathematician, named Janellus Turianus, commonly pleased the emperor Charles V. with some curious results of his study. He would make wooden sparrows fly up and down the emperor's dining room, and return to him that sent them. Sometimes he would cause little soldiers, armed *cap a pee*, to muster on the emperor's table, and with great dexterity perform their military exercises, which being a strange and uncommon sight, the warden of the convent of St. Jerome, being unskilled in those mysterious arts, suspected it to be downright witchcraft, done by a league with the devil.

A Roman artificer had the knack of making glass utensils so strong, yet pliable, that they could not be broken. A phial so contrived he made a present to the emperor Tiberius, who accepted it, with commendations of his art: the mechanist, to raise the admiration of the spectators, and ingratiate himself further into the favour of the emperor, took the phial again

out of Cæsar's hand, and threw it with all his force against the floor, without any prejudice, save only that it was a little shrivelled, which, with an instrument he had about him, he immediately put again into its original form, by hammering it as they do brass or other metal. All this being done, without any collusion, he flattered himself that it would raise him into an intimate familiarity with Tiberius, and make him a great man; but those teeming ambitious hopes were soon frustrated; for the Emperor enquired whether there were any other proficients in that art, and he answering "there were none but himself that had attained to perfection in it," Tiberius commanded his officers to cut off his head, saying, "If this art should be more known and practised, gold and silver would be as cheap as dirt and soil of the streets." However this piece of cruelty was to little purpose, for Mr. Knowles acquaints us, in his Turkish History, page 1273, that in the year 1610, which was a long time after, among other rarities presented to the king of Spain by Sophy of Persia, there were six vessels of Maleable Glass, that could not be broken, which shews that the art continued, and is now every day's practice.

At Segovia in Spain, is a mint so ingeniously contrived, that one part of it dilates an ingot of gold into proper dimensions for coinage, another part delivers the plate so formed into another that stamps it; from that part of the engine it is delivered to another that cuts it, according to the standard; and, last of all, it falls into a repository in another room, where the officer appointed for that purpose, finds money ready coined without any other help than that of the engine.

Oswaldus Northengerous, an incomparable artificer, turned sixteen hundred platters out of ivory, in their proper figure, and yet were so thin and small, that the whole number, all at the same time, were inclosed in a cup turned out of a common pepper-corn.

At Herdelburg, in Germany, upon the Town House was a clock with divers motions, and when the clock struck, the figure of an old man pulled off his hat, a cock crowed and clapt his wings, soldiers fought with one another, &c. but this curious piece of workmanship, with the castle and town, were burnt by the French, when they took those garrisons, June 2, 1693.

At Strasburg, in Germany, is a clock invented and made by Conradus Dasepodius, anno 1571, before which, on the ground, stands a celestial globe, demonstrating the diary and annual motions of the heavens, stars, and planets, with great exactness. In the clock the eclipses of the sun and moon are shewed in two tables. On a third table, which is subdivided into three parts, are seen on the first table, the statues of Apollo and Diana, and the annual revolution of the heavens. The second shews the year of the world, the year of our Lord, the hour and minutes of the day, the great festivals, and the dominical letter. The third makes a plan of Germany, and more particularly the city of Strasburg. In the middle frame of the clock is an astrolabe, representing the twelve signs of the zodiac, and the planets posited in those houses, as they appear every day. There is likewise a terrestrial globe, where the quarters, the half hour, and the sixty minutes are delineated. There are also the statues of the spring, summer, and winter. In the higher frame of the clock are the statues of four very old men, which strike the quarters of the hour: when also appears a statue of Death attempting to strike each quarter, but is forced back by a statue of Christ with a spear in his right hand, for three quarters; but, at the end of each hour, the statue of Christ diappears, and that of Death strikes the hour with a dead man's bone in his hand; and then the chimes play. On the top of the clock is a cock, which every twelve hours claps his wings and crows audibly.

At Trivoli, an ancient city in Compagna di Roma,

on the river Tevirone, eighteen miles from Rome, in the gardens of Hippolitas d'Este, Cardinal of Ferrara, there is a lively figure of several sorts of birds, perching on the tops of trees, which, by a water-organ conveying water through the body and branches of the trees, makes the birds for some time chant melodiously; but, as soon as an owl appears out of a bush, by the same hydraulic art, the birds are, all of a sudden, hushed and silent. Claudius Gallus, as Possevine reports, was author of this curiosity.

Proclus, whose fame in mathematical performances equalled that of Archimedes, made burning glasses in the reign of Anastatius Decorus, of such wonderful efficacy, that, at a great distance, he burnt and destroyed the Mysian and Thracian fleet of ships that had blocked up Byzantium, now Constantinople.

Sir Christopher Wren found out the way of making diaries of wind and weather, and the different representations of the air in respect to heat, cold, drought, and moisture, in every day in the year, and this, in order to the history of seasons, with observations which are the most healthful or contagious to man or beast. To this end he also contrived a thermometer to be its own register. He has also made instruments to shew the mechanical reason of sailing to all winds, with several other curiosities, as useful as admirable, when they fall into the hands that have sense enough to know the use of them.

The honourable Mr. Boyle was the inventor of the barometer, commonly called the weather-glass, which is now of general use to the world, which, before being only filled with water, was a mere whim without use: but now being filled with quicksilver, the degrees exactly calculated, and made portable by an ingenious artist, will never fail to make a true discovery of the weather for many years together, as has been experimented by the learned Dr. Wallis, of Oxford.

And whilst I am mentioning the name of that learned person, Dr. Wallis, Doctor in Divinity, Geometry, Professor in Oxford, and Fellow of the Royal Society, let me not forget that he was the first in England that made art supply the defects of nature, learning persons that were deaf and dumb to speak and write distinctly and intelligibly; as, for example, Mr. Nathaniel Whaly, born in Northampton, of reputable parents, was taught by him in Oxford (at twenty six years years) in the year 1662, and that in the space of one year. At the same time the doctor taught a son of the Lord Wharton's, that was born deaf and dumb, and afterwards Mr. Popham; but Dr. Holder laying (though unjustly) some claim to the last performance, and the strangeness of the thing being the discourse of all England, Mr. Whaly was had before the Royal Society, and there discoursed to their entire satisfaction. King Charles II. also hearing of it, desired to see Mr. Whaly, who appearing before him, his Majesty asked him several questions, and was satisfied with his pertinent answers; among others, he asked Mr. Whaly, who taught him to speak and write? to which he replied, Dr. Wallis did. This worthy doctor, in a treatise entitled *De Loquela*, has given us the method how to teach deaf and dumb folks to speak and write a language, and more particularly, in a Letter to Mr. Thomas Beverly, Secretary to the Royal Society, dated September 30, 1698, and printed in the Philosophical Transactions for October 1698, No. 245, p. 349. It is a great pity that this letter is not printed in Latin, for the benefit of foreigners, and better known among the English; for the method the doctor prescribes is so plain, familiar, and demonstrative, that any person of common ingenuity might attain this art with ease and abundance of pleasure.

DESCRIPTION OF A CASCADE NEAR TERNI, IN ITALY.

In a Letter from a Gentleman.

I AM still at Terni; I have been taken about five miles from the place, to see the vast cascade. It is a work of nature, and one of the most stupendous of her irregularities. The noise is such that I do not hear yet; and you can conceive nothing so stupendous as the sight of this vast and terrible cataract. The water that throws itself down is a whole river; the fall is not less than three hundred feet. Conceive to yourself a river thrown from the sharp edge of a rock to such a depth, without interruption, and received on another rock below, and you will imagine that both the eye and the ear must be filled with the effect. The very appendages to this miracle are themselves amazing; the mountain which we ascended to it is of white marble: they call it Monte di Marmore. I was vastly delighted with the sight of it; but I had like to have had a very feeling remembrance of it also. The way up is in some parts very steep, the track not greatly beaten, and you may imagine that a pavement of natural marble slabs is not the best footing in the world for a horse. It was against the advice of the company that I would continue on the creature; they had dismounted, and the guides, who told them it was the custom to do so, were leading their horses. I placed more dependence than I ought to have done on mine, and I was nearly a sacrifice to the temerity. We were on a part where the narrow road was winding, as well as steep; vast rocks of marble, like walls were on each side, and their height and edges frightful enough. I was admiring so strange and beautiful a scene as presented itself before me, when my horse stumbled. Happy for the company I was hindmost; to stumble is to fall, in such a place; and to fall, is to roll down to the next angle of some block of marble that stops you. I followed the creature down the

precipice, but his weight carried him much before me. He was destroyed by the corner of a huge mass of marble, that stood out at a turning of the road; and the dexterity of one of the guides, who ran faster than I rolled down, saved me from certain destruction, from his flouncing in his agonies; for I must have fallen upon his feet. It was not long before we came in sight of the cascade. We marched to it nearly in front; but you would not guess at the appearance: nothing of that smooth sheet of water which I had expected, presented itself. We saw before us a cloud, or a thick smoke, rising from the ground to the height of six hundred feet at least: and as the situation was high, and the day none of the brightest, you will have some guess at the violence, as well as depth of the fall, when I have told you that this is no other than the quantity of loose particles of the water which rebound from the rock that receives the cataract; and, by the violence of the fall, are thrown twice, or more than twice the height of the level of the river. Above this cloud appears continually the succession of particles of water that form, without remission; and, after they have reached this height, they fall again, in form of a shower of rain, on all the circumjacent place. When the weather is calm, they drop in a smaller compass; but a gust of wind blows the artificial shower to a vast distance.

As we approached this cloud, we saw all the leaves of the trees and plants, and the very surface of the mountain, covered with a fine powder, as white as snow, and equal in softness to that used for the hair. This is the marble of the mountain, beat and washed off by the fall of the water, and raised in these imperceptible particles in the artificial clouds: they fall again in the shower, and the water runs off without them. You have seen the effects of the salt left by what is called the spray of the sea: our gardens in the inland parts of Essex are often destroyed by it, after a strong wind; that, however, is but partial; this is universal: every thing is covered with it, and it visibly injures and impedes the growth of the vege-

tables, by choaking up their pores, and obstructing the dews that should be received into them.

We had a very advantageous view of the cataract, as we advanced nearer to it. A little wind rose upon us, which carried away the cloud on one part, and gave us a view into the fall. We examined every part of the cascade, the river above, the channel below, the descent of the flood, and the bason into which it is received at the bottom. It is the Velino, a not inconsiderable river, the Velinus of Virgil, which forms this cataract. It runs through a great extent of country, nearly level, before it arrives at the rock: but though the declivity is not great, the sudden fall at this place draws on a very strong current. For some miles above, the river is very rapid; and, I need not tell you, nothing is seen upon it. The rock, upon whose level surface it is received before this fall, is of white marble, as is the rest of the mountain, and the descent is a perpendicular wall of near three hundred feet; the edge is worn round where the water falls over; but such a body, moving with such rapidity, does not trickle down the surface of it: the whole river rolls over, and throws itself forward with a vast sweep. It is said there is, towards the bottom, a dry space between this rock and the water; but I do not know how any body has been informed of this. The sight from the top is dreadful, yet wonderfully pleasing; the river is clear; and the immediate and rapid curve formed in the bending over, is a sight of pleasing horror. While I was near this part, a little kind of boat (a coarse contrivance of some peasants up the river) came down the stream: we saw it at a distance, and kept our eyes upon it: it had been tost from its fastening, and the destruction was near. It travelled down to us with great rapidity: as it came near, it was difficult to keep the eye upon it. When it came to the precipice, it rolled clean over, and in a moment struck upon the head of water at the bottom. Whether it met a rock in its way, or to what other accident it was owing, I know not; for it is impossible the mere resistance of the water could do it; it re-

bounded up to a very considerable height, in three separate pieces, and immediately after rolled down the channel with the water.

From this terrifying view of the top, we descended to examine the bottom of the cataract. Here was a sight truly surprising. You heard me mention the smooth and compact body in which the water rolled over the edge of the precipice: there is nothing in the descent to break it, but the mere resistance of the air, and the rapidity of that descent; yet it is here divided all to pieces; and as it comes near the bottom, is not a bed of water, but a kind of heavy and terrible shower of rain. It is from this that the drops rise in a constant succession, so as to form the cloud already mentioned; which descends again in still more minute drops, after it has been tossed to that surprising height.

From the level of the river, that is, from the head of the cataract, the sight is very odd. When one looks upon this rising cloud, the body of it seems no more than a thick vapour, or mist: it is white indeed; but whether this be owing to the disturbed motion of the water, or to the small particles of the marble carried up with it, I cannot say. It is seen in a continued fluctuation, arising by starts and lifts one way, and falling more equally another: it rose a vast height above our heads, and then seemed to lose itself in the air, like a smoke at a farther distance from the chimney; and it was odd to us, to conceive that it came down again.

The bottom is a part one would have yet more curiosity to examine than even the top: but the curiosity is not so happily satisfied. We had the advantage of a wind to carry off the pillar of the ascending cloud, and so to shew us the lower part; but still all was confusion and obscurity. I had a great mind to see the vast bason into which the falling river was received; but all I could discover of it, was a great cavity: the surface of the water in this, was in too much motion to let me see any thing of it distinctly; and the clash of the falling drops, with those which

formed the rising cloud, confused the eye and deafened the ear.

The quantity of water raised in form of this cloud, must be very considerable; for it diminishes the very river in a great proportion. The quantity of water carried off by the stream, as it runs from the great bason, in which it is received immediately from the cataract, is nothing in proportion to that which is brought to it by the river above. It throws itself down in a vast sheet; and the whole river, for a great way above the head, is considerable in its extent; but it runs from the bason (though with violent rapidity) yet in a very much diminished body: it bursts away from the reservoir all in foam, and roars along among the marble rocks that confine it on each side, and which in some places interrupt the channel: but the bed here is of small capacity, in proportion to the river above: it runs in this peculiar channel to some distance, and then falls into the Nar, the Nera of the ancient Romans.

THE ELEPHANT.

Of all the animals with which we are acquainted, the elephant is, next to man, the most sagacious. The dog, the horse, and some others, are equally docile, and perhaps still more submissive to man; but none of them discover such strong indications of memory, and the power of connecting causes with events, which we call reasoning, as the elephant. Hence it is not only susceptible of kindness and affection to the person who feeds and cares for it, and of immediate resentment against those who injure it; but it has also the faculty of retaining the sense of injury for a long time, and of seemingly contriving plans for being revenged, and executing these with much cunning and sagacity at a distant period. On account of these qualities, not less than because of its great strength, the elephant has long been the favourite do-

mesticated animal among the monarchs of those countries where it is a native.

The elephant, when tamed, on account of its great size, and the vast quantity of food it consumes, is too expensive for private individuals; and is, therefore, in a great measure an attendant of royalty, and the most unequivocal badge of dignity and state in eastern nations. It has been for time immemorial also employed in war; and in old times the Asiatic princes used to indicate the force of armies, by the number of elephants each could bring into the field, in the same manner as the maritime nations in Europe now estimate their power by the number of ships of war they can fit out for sea. They were, indeed, in those days, a kind of moving fortresses, which, for many ages, could only be resisted by more powerful fortifications of the same sort. It was only after the Greeks and Romans came to contend for power with the princes of Asia and Africa, that it was discovered that even the enormous strength of these animals was not proof against the power of men acquainted with the best modes of military tactics. They were long, however, employed in the armies both of Carthage and of Rome. But in modern times their use has been entirely laid aside in battle, where European forces can be brought into the field; and they are now employed only for parade, or as beasts of burden, which in the warmer climates are peculiarly commodious; and where provender can be found in abundance, extremely useful attendants of an army. During the war just now concluded with Tippoo Saib, lord Cornwallis employed elephants for transporting his artillery up the Gauts, without which, I have been assured, he would have found great difficulty in accomplishing the object of his wishes.

The elephant is a huge, unwieldy, uncouth looking animal, which, if we had not been acquainted with its rare qualities, all mankind would have called ugly. Its immense ears, its huge tusks, its flexible proboscis, which may be writhed into an infinite variety of forms, its thick clumsy legs, and small eyes, all con-

tribute to render this animal a striking object to those who behold it, even independent of its size; but when taken altogether, it is so unlike to what we call elegant in other creatures, that it could only have been viewed as an object of terror or disgust.

The works of God are wonderfully varied; and the same objects are attained by means so very dissimilar, as to afford a perpetual source of wonder and of admiration to the contemplative mind. The power of animals, in a good measure, depends on the structure of those members of the body they can employ as tools for effecting its purposes; and it has long ago been justly observed, that the human hand is a tool of the most admirable construction, which, under the guidance of reason, has enabled man to effect those wonderful things he has achieved. The paw of the lion, and others of the cat kind, which admits of being expanded and contracted like the human hand, gives to these animals a tremendous power, which is exerted for no other purpose but to destroy. The trunk, or proboscis, of the elephant, is a member, which, to all appearance, could be of little use for grasping small objects, or effecting any useful purpose; yet it is so admirably constructed, by means of flexible cartilages and muscles, and is endowed at the same time with such sensibility and strength, as to be capable of being employed for many uses, that we could not, without experience, have believed possible. With its point it can grasp even very small objects, with wonderful pliability; and by its power of being contracted or dilated, turned upwards or downwards, or in any other direction, at will, it is capable of being employed by that animal for much the same purposes as the human hand by man; and what seems still more extraordinary, notwithstanding its great flexibility and sensibility, it is so little susceptible of pain in that member, that it is employed as a tool for striking and chastising any object of its resentment with great force, so as to be used instead of a rod of correction for most purposes.

Though the elephant be easily tamed, and contracts a great familiarity and kindness for man, it can never be so thoroughly domesticated as to procreate while in confinement. All those that have ever been under the dominion of man have been bred in the desart, and catched by art. The various devices that have been employed for catching them, have been so often re-told, in books of various descriptions, that it is needless to repeat them here. The tame elephants themselves have been found to be at all times the best agents for subduing the wild ones when first caught.

The elephant is a native of Asia and Africa, and is not to be found in its natural state either in Europe or America. From the river Senegal to the Cape of Good Hope, they are met with in great numbers. In this extensive region, as they are more numerous than in any other part of the world, so are they less fearful of man. The savage inhabitants of this dreary country, instead of attempting to subdue this powerful animal, and rendering it subservient to their necessities, seem only desirous of avoiding its fury. In the internal parts of the country, which are uninhabited by man, they are found in large herds; but these are only at times seen by a few persons who venture a little into those inhospitable regions. Along the coasts, especially near the European settlements, few are to be seen; but the inhabitants there, allured by the gain they make by their tusks, are now become extremely expert in shooting them, and frequently make excursions into the interior parts of the country, for the sake of hunting such stragglers from the herd as may chance to fall in their way; but in this kind of enterprise the hunters run great risks, and are therefore obliged to act with much caution. In approaching this animal, great care must be taken to steal upon him unperceived. If the elephant discover his enemy near, he rushes out, and endeavours to kill him. One of these hunters being out upon a plain, under the shelter of a few scattered thorn trees, thought he could be able to advance near enough to

shoot an elephant that was at a little distance from him; but he was discovered, pursued, and overtaken by the animal, which laid hold of him with his trunk, and beat him instantly to death. It is peculiarly dangerous to attack a female elephant while its young is along with it: for the affection between the parent and the young is so strong and reciprocal, that unless they be both killed, there is no safety; for the survivor will never desert its fallen companion, but assail the enemies with the utmost fury, till either itself or the hunters be killed. Mr. Bruce relates a combat of this sort, in which the dam was shot at the first by the hunters, and though the young was so small as not to exceed the size of an ass, and had run away at first from fear; yet on seeing its dam fall, it returned, and attacked the hunters with the utmost fury, until it was at length shot dead by them.

The height of the elephant at the Cape, is from twelve to fifteen feet. The female is less than the male, and her tusks do not grow to such a size. The largest tusks weigh an hundred and fifty pounds, and are usually sold to the governor of the Cape, at the rate of a guilder per pound; so that a man may earn three hundred guilders at one shot; a strong inducement for running some risk. The tusk is the only part of the elephant that is productive of profit to the hunter.

The eyes of the elephant are small; but they are lively, brilliant, and capable of great expression. His ears are large, and much longer in proportion to his body than those of the ass; they lie flat on the head, and are commonly pendulous: but he can raise and move them with great facility, and frequently uses them as a fan to cool himself. His hearing likewise is remarkably fine; for he delights in the sound of musical instruments, and moves in cadence to the trumpet and tabor. There are four grinders in each jaw, closely united together, forming with the jaw bone one hard and compact body. The texture of the skin is uneven, wrinkled, and knotty; full of deep fissures, resembling the bark of an old oak tree, which

run in all directions over its surface. It is of a deep tawny colour, approaching to black; the inside of the ear is of a faint flesh colour. The legs resemble massy columns of fifteen or eighteen inches in diameter, and not exceeding four or five feet in height. The foot is short, and divided into five toes, covered with the skin so as not to be visible. To each toe there is affixed a nail or a hoof of a horny substance.

The trunk, or proboscis, is composed of membranes, nerves, and muscles; and is both an organ of feeling and of motion. The animal can not only move and bend it, but can contract, lengthen, and turn it in every direction. The extremity of the trunk terminates in a protuberance, which stretches out in the form of a finger, and possesses in a great degree the niceness and dexterity of that useful member. It is equally flexible, and as capable of laying hold of objects as the fingers of a man. With it he lifts from the ground the smallest piece of money; he selects herbs and flowers, and picks them up one by one; he unties the knots of ropes, opens and shuts gates, &c. With his trunk he grasps any body which it is applied to so firmly, that no force can tear it from his gripe. It is eight feet long in an elephant of fourteen feet high, and five feet in circumference at the thickest part. The nostrils are situated at the extremity; through which it draws in water by a strong suction, either for the purpose of quenching its thirst, or of washing and cooling itself, which it frequently does by taking a large quantity, part of which it carries to its mouth and drinks, and by elevating its trunk, allows the remainder to run over every part of its body. The mouth is situated directly under the trunk, from each side of which, project upwards, the two large tusks which are so valuable on account of the ivory, of which substance they entirely consist.

Roots, herbs, leaves, and tender wood, are the ordinary food of the elephant. He does not ruminate, and has but one stomach; this want however is amply supplied by the magnitude and length of his intestines, and particularly of the colon, which is from

fifteen to twenty feet in length, and two or three in diameter. When one of them discovers a plentiful pasture, he calls to the others, and invites them to partake. As they require a great quantity of forage, they frequently change their pastures, and do incredible damage wherever they stray into cultivated grounds. On these occasions it is difficult to drive them off. They go in herds, nor is it easy to separate them. They generally act in concert, whether they attack, march, or fly.

The ordinary walk of the elephant is not quicker than that of a horse; but when pushed he assumes a kind of ambling pace, which in fleetness is equal to a gallop. He goes forward with ease; but it is with great difficulty he turns himself round; and that not without taking a large circuit. It is generally in narrow and hollow places that the negroes attack him, and cut off his tail, which they value above every other part of his body. He swims well, and is of great use in carrying baggage across large rivers. When swimming he raises his long trunk above the surface of the water for the sake of respiration, every other part of his body is below. In this manner several of these animals swim together, and steer their course without danger of running foul of each other.

The elephant when tamed is gentle, obedient, and docile; patient of labour, and so attentive to the command of its governor, that a word or a look is sufficient to stimulate it to the most violent exertions. In India, where they were once employed in launching ships, one of them was directed to force a large vessel into the water, which proving superior to its strength, the master in an angry tone cried out, "Take away that lazy beast, and bring another in its place;" the poor animal instantly redoubled it efforts, fractured its skull, and died upon the spot.

The conductor of the elephant is usually mounted upon its neck; and sometimes makes use of a rod of iron sharpened at the end, with which he urges the animal forward; but usually his voice alone is sufficient for that purpose. Its attachment to its keeper

is very great; it knows his voice; it receives his orders with attention, and executes them with eagerness, but without precipitation. All its motions are orderly, and seem to correspond with the dignity of its appearance, being grave, majestic, and cautious. It kneels down for the accommodation of those who mount upon its back, and its pliant trunk even assists them to ascend. It suffers itself to be harnessed, and seems to have a pleasure in the finery of its trappings. They are now used chiefly for the purposes of labour or magnificent parade.

The Indian princes in their travels are attended by hundreds of these animals. Some are employed to convey the ladies which compose the seraglio in latticed cages made for that purpose, and covered with branches of trees: whilst others transport immense quantities of baggage, with which the sovereigns of the east are always accompanied in their marches from one place to another. They are likewise made use of as the dreadful instruments of executing condemned criminals; a task which they perform with great dexterity. At the word of command they break the limbs of the criminal with their trunks; they sometimes trample him to death, or impale him on their enormous tusks, just as they are directed by their more barbarous keeper.

Sometimes the elephant is employed like the ancient gladiators at Rome, to fight with wild beasts in the Arena, for the purpose of affording amusement to a luxurious court. Two strong tigers are usually deemed a match for an elephant.

The time of the gestation of the elephant is hitherto but imperfectly known. Aristotle says it goes two years with young; which is the more likely, as the season of desire, in the male, returns but once in three years. The female produces but one young at a time. The young elephants are said to suck with their trunk, the teats of the female being situated between the fore legs.

The elephant is thirty years in arriving at its full growth; and is said to live, even in a state of capti-

vity, to the age of an hundred and twenty, or an hundred and thirty years. In a state of freedom it is supposed to live much longer.

The elephant will drink wine, and is fond of spirituous liquors. By shewing him a vessel filled with arrack, he is induced to exert the greatest efforts, and perform the most painful tasks, in hopes of receiving it as a reward of his labour. To disappoint him is dangerous, as he seldom fails to be revenged. The following instance is given as a fact, and deserves to be recorded. An elephant, disappointed of its reward, out of revenge killed his cornac or governor. The poor man's wife, who beheld the dreadful scene, took her two infants and threw them at the feet of the enraged animal, saying, "since you have slain my husband, take my life also as well as that of my children." The elephant instantly stopped, relented, and, as if stung with remorse, took the eldest boy in its trunk, placed him on its neck, adopted him for its cornac, and would never allow any other person to mount it.

Many other facts, equally curious and interesting, might be quoted respecting this singular animal; but those already cited are sufficient to show that the elephant is possessed of faculties superior to those of any other animal. We must at the same time admire the beneficent order of that dispensation, which to an animal of such unequalled powers has added a disposition so mild and tractable. What ravages might we not expect from the prodigious strength of the elephant if combined with the fierceness and rapacity of the tiger!

ON THE INSTINCT OF ANIMALS.

We come into the world ignorant of every thing, yet we must do many things in order to our subsistence and well being. A new-born child may be carried in arms, and kept warm by his nurse; but he

must suck and swallow his food for himself. And this must be done before he has any conception of sucking and swallowing, or of the manners in which they are to be performed. He is led by nature to do these actions, without knowing for what end, or what he is about. This we call instinct.

In the animals we are best acquainted with, and which we look upon as the more perfect of the brute creation, we see much the same instincts, or mechanical principles of action, as in the human kind, or very similar ones, suited to the particular state and manner of life of the animal.

Besides these, there are, in brute animals, instincts peculiar to each tribe, by which they are fitted for defence, for offence, or for providing for themselves and for their offspring.

It is not more certain, that nature hath furnished various animals with various weapons of offence and defence, than that the same nature hath taught them how to use them; the bull and the ram to butt, the horse to kick, the dog to bite, the lion to use his paws, the boar his tusks, the serpent his fangs, and the bee and the wasp their sting.

The manufactures of animals, if we may call them by that name, present us with a wonderful variety of instincts belonging to particular species, whether of the social or the solitary kind—the nests of birds, so similar in their situation and architecture in the same kind, so various in different kinds—the webs of spiders and of other spinning animals—the ball of the silk worm—the nests of ants and other mining animals—the combs of wasps, hornets, and bees,—the dams and houses of beavers.

The instinct of animals is one of the most delightful and instructive parts of a most pleasant study, that of natural history; and deserves to be more cultivated than it has yet been.

Every manufacturing art among men was invented by some man, improved by others, and brought to perfection by time and experience. Men learn to work in it by long practice, which produces a habit.

The arts of men vary in every age, and in every nation, and are found only in those who have been taught them.

The manufactures of animals differ from those of men, in many striking particulars.

No animal of the species can claim the invention. No animal ever introduced any new improvement, or any variation from the former practice. Every one of the species has equal skill from the beginning, without teaching, without experience or habit. Every one has its art by a kind of inspiration. I do not mean that it is inspired with the principles or rules of the art, but with the ability and inclination of working in it to perfection, without any knowledge of its principles, rules, or end.

The more sagacious animals may be taught to do many things which they do not by instinct. What they are taught to do, they do with more or less skill, according to their sagacity and their training. But, in their own arts, they need no teaching nor training, nor is the art ever improved or lost. Bees gather their honey and their wax, they fabricate their combs, and rear their young at this day, neither better nor worse than they did when Virgil so sweetly sung their works.

The work of every animal is indeed like the works of nature, perfect in its kind, and can bear the most critical examination of the mechanic or the mathematician. One example from the animal last mentioned may serve to illustrate this.

Bees, it is well known, construct their combs with small cells on both sides, fit both for holding their store of honey, and for rearing their young. There are only three possible figures of the cells, which can make them all equal and similar, without any useless interstices. These are the equilateral triangle, the square, and the regular hexagon.

It is well known to mathematicians, that there is not a fourth way possible, in which a plane may be cut into little spaces that shall be equal, similar, and regular, without leaving any interstices. Of the three,

the hexagon is the most proper, both for conveniency and strength. Bees, as if they knew this, make their cells regular hexagons.

As the combs have cells on both sides, the cells may either be exactly opposite, having partition against partition, or the bottom of a cell may rest upon the partitions between the cells on the other side, which will serve as a buttress to strengthen it. The last way is best for strength; accordingly, the bottom of each cell rests against the point where three partitions meet on the other side, which gives it all the strength possible.

The bottom of a cell may either be one plane, perpendicular to the side partitions, or it may be composed of several planes, meeting in a solid angle in the middle point. It is only in one of these two ways that all the cells can be similar without losing room. And, for the same intention, the planes of which the bottom is composed, if there be more than one, must be three in number, and neither more nor fewer.

It has been demonstrated, that, by making the bottoms of the cells to consist of three planes meeting in a point, there is a saving of material and labour no way inconsiderable. The bees, as if acquainted with these principles of solid geometry, follow them most accurately; the bottom of each cell being composed of three planes which make obtuse angles with the side partitions, and with one another, and meet in a point in the middle of the bottom; the three angles of this bottom being supported by three partitions on the other side of the comb, and the point of it by the common intersection of those three partitions.

One instance more of the mathematical skill displayed in the structure of a honey-comb, deserves to be mentioned.

It is a curious mathematical problem, at what precise angle the three planes, which compose the bottom of a cell, ought to meet, in order to make the greatest possible saving, or the least expence of material and labour.

This is one of those problems, belonging to the

higher parts of mathematics, which are called problems of maxima and minima. It has been resolved by some mathematicians, particularly by the ingenious Mr. Maclaurin, by a fluxionary calculation, which is to be found in the transactions of the Royal Society of London. He has determined precisely the angle required; and he found by the most exact mensuration the subject could admit, that it is the very angle in which the three planes in the bottom of the cell of a honey-comb do actually meet.

Shall we ask here, who taught the bee the properties of solids, and to resolve problems of maxima and minima? If a honey-comb were a work of human art, every man of common sense would conclude, without hesitation, that he who invented the construction, must have understood the principles on which it is constructed.

We need not say, that bees know none of these things. They work most geometrically, without any knowledge of geometry; somewhat like a child, who, by turning the handle of an organ, makes good music, without any knowledge of music.

The art is not in the child, but in him who made the organ. In like manner, when a bee makes his combs so geometrically, the geometry is not in the bee, but in that Great Geometrician, who made the bee, and made all things in number, weight, and measure!

BAVARIAN SALT-WORKS.

Between Saltzburg and Uncken, in Germany, which are about sixteen English miles distant, are the Bavarian salt-works, at Reichenhall, where the salt-spring is called God's Goodness. The water is raised by two large wheels, on the edges of which are fastened small leathern buckets, that throw the water up to a place, whence half of it is conveyed in leaden pipes over high mountains, as far as Traunstein;

where, (though it is three German miles distant from the spring), more salt is made than at Reichenhall. Near this salt spring is a stream of fresh water, by the swift current of which, the wheels and water-engines are worked. As these springs are encompassed with hills, and the place, by laying in a valley, was supposed in danger of being overflowed, an aqueduct was made at a prodigious expence, about three hundred years ago. This channel is, indeed, an amazing work, running half a league in length under the town of Reichenhall, and several gardens and fields, twelve fathoms below the surface. But the most curious circumstance is, that this subterraneous channel is navigable, and people pass through it in a boat by the help of candles, with such rapidity, that they get into open day-light in a quarter of an hour. The water is generally between three and four feet deep; but it is often so swelled by the rains, as not to leave room for the boat with the passengers sitting upright. The canal is five feet broad, and every eight or ten years the bottom is cleared of the stones carried thither by the floods, or wantonly thrown down the spiracles or openings, which are raised up in the form of towers, and are open on the top to admit the fresh air. The roof is not only formed of free-stone, but in many places covered with a very hard kind of rosin, as with a varnish, so that it looks as if it were one entire solid piece. The descent to this subterraneous canal, is by the steps of a tower near the spring.

THE RUINS OF HERCULANEUM AND POMPEII.

An inexhaustible mine of antique curiosities exists in the ruins of Herculaneum, a city lying between Naples and Mount Vesuvius, which, in the first year of the reign of Titus, was overwhelmed by a stream of lava from the neighbouring volcano. This lava is

now of a consistency which renders it extremely difficult to be removed, being composed of bituminous particles, mixed with cinders, minerals, and vitrified substances, which altogether form a close and ponderous mass. In the revolution of several ages, the spot it stood upon was entirely forgotten; but in the year 1713, it was accidentally discovered by some labourers, who, in digging a well, struck upon a statue on the benches of the theatre. Several curiosities were afterward dug out, and sent to France, by the prince of Elbauf; but the search was soon discontinued, and Herculaneum remained in obscurity till the year 1736, when the king of Naples employed men to dig perpendicularly eighty feet deep, whereupon not only the city made its appearance, but also the bed of the river which ran through it. In the Temple of Jupiter was found a statue of gold, and the inscription that decorated the great doors of the entrance. In the theatre were some fragments of a gilded chariot of bronze, with horses of the same metal, which had been placed over the principal entrance; on a ballustrade which divided the orchestra from the stage, was found a row of statues; and on each side of the pulpitum stood an equestrian figure of a person of the Nonian family.

A great variety of curious articles have also been found in other parts of this city, which are now arranged in a wing of the palace at Naples, and consist not only of statues, busts, altars, inscriptions, and other appendages of opulence and luxury; but also comprehend a complete assortment of domestic, musical, and surgical instruments; tripods of elegant form and exquisite execution; lamps and chandeliers in endless variety; pateras, and other appurtenances of sacrifice; mirrors of polished metal, silver kettles, cisterns for heating water, and various culinary utensils; a lady's toilet, furnished with combs, thimbles, rings, paint, ear-rings, &c. &c. Two statues, representing a Mercury and a sleeping Faun, are particularly admired by connoisseurs; and several rooms are

filled with handsome busts. The fresco paintings, which, for the sake of preservation, have been framed and glazed, are deposited in another part of the palace. A large parcel of manuscripts were also found among the ruins, and very sanguine hopes were entertained by the literati, that many works of the ancients would be restored to light, and that a new mine of science was on the point of being opened; but the difficulty of unrolling the burnt parchments, of pasting the fragments on a flat surface, and of decyphering the obscure letters, have proved such obstacles, that very little progress has been made in the work.

The streets of Herculaneum appear to have been perfectly straight and regular; the houses well built, and generally uniform; and the rooms paved either with large Roman bricks, mosaic work, or fine marble. It appears that the town was not filled up so unexpectedly with the melted lava as to prevent the greatest part of the inhabitants from escaping with their richest effects: for there were not more than a dozen skeletons found, and but little gold or precious stones.

The town of Pompeii was involved in the same melancholy catastrophe with Herculaneum; but it was not discovered till near forty years after the discovery of that place. One street, which has been entirely cleared, is paved with the same kind of stone of which the ancient roads are made; and narrow causeways are raised about eighteen inches on each side, for foot passengers. Dr. Moore observes, that the street itself is not so broad as the narrowest part of the Strand, in London, and is supposed to have been chiefly inhabited by tradesmen. The houses are small, but neat and convenient; the stucco on the walls is smooth and beautiful; and some of the rooms are ornamented with paintings, which appear extremely fresh, and tolerably well executed. In one part of the town is a rectangular building, with a colonnade toward the court, somewhat resembling the Royal Exchange, in London; and at a considerable distance is the temple of the goddess Isis, the pillars of which are of brick stuccoed; but

there is nothing very magnificent in the appearance of this edifice. Few skeletons were found in the streets of this town, but in the houses there were many in situations which plainly proved that they were endeavouring to escape when the tremendous torrent of lava overtook them.

FALL OF THE NIAGARA.

About six leagues from the fort of Niagara, in Canada, in North America, is the greatest cataract in the world, known by the name of the *Waterfall of Niagara*. The river at this fall runs from S.S.E. to N.N.W.; and the rock of the fall, forms a kind of figure like a hollow semicircle or horse-shoe. Above the fall, in the middle of the river, is an island about eight hundred feet long; the lower end of which is just at the perpendicular edge of the fall. Before the water comes to this island, it runs but slowly compared with its motion afterwards, when it grows extremely rapid, running with a surprising swiftness before it comes to the fall. It is perfectly white, and in several places is thrown high up into the air. The water that runs down on the west side is in greater abundance, and whiter than that on the opposite side; and seems almost to outfly an arrow in swiftness. When a person is at the fall and looks up the river, he may perceive that the water is every where exceedingly steep, almost like the side of a hill; but on looking at the fall itself, it is impossible to describe the astonishment it occasions.

The height of the cataract, as measured by mathematical instruments, is found to be exactly a hundred and thirty-seven feet; and when the water is come to the bottom it flies back to a great height in the air. The noise may sometimes be heard at the distance of forty miles, but seldom farther. At some times the fall makes a much greater noise than at others; and

this is regarded as an infallible prognostic of rain or other bad weather.

From the place where the water falls there arises a prodigious vapour, like a thick smoke, insomuch that when viewed at a distance, a stranger might suppose, that the Indians had set their forests on fire. These vapours rise very high in the air when it is calm, but are dispersed by the wind when it blows hard. If any person go into this vapour, or if the wind blow it on him, it is so penetrating, that in a few moments he will be as wet as if immersed in water.

Some persons are of opinion, that when birds happen to fly into the smoke of the fall, they immediately drop down, and perish in the water; either because their wings are become wet, or that the tremendous noise of the fall astonishes and confounds them: but others think that this idea is merely chimerical; because, among the great numbers of birds found dead below the fall, there are no other sorts than such as live and swim frequently in the water, as swans, geese, ducks, teal, &c. Great flocks of these animals are often seen going to destruction, in the following manner:—They swim in the river above the fall, and so are carried down lower and lower by the water; and as water-fowl are commonly pleased with being carried by the stream, they indulge themselves in this pleasure, till the rapidity of the water renders it impossible for them to rise, and they are consequently hurried down the precipice.

In the months of September and October, such prodigious quantities of dead water-fowl are found every morning below the fall, that they afford ample subsistence for the garrison at the fort. Here also are frequently found the bodies of deer, bears, and other animals, which have attempted to cross the water above the fall. Some melancholy instances of human beings having lost their lives in a similar manner, are related by travellers; and the following one is too affecting to be passed over in silence.—

"An unfortunate Indian was reposing, in a state of

inebriety, in his canoe, which was properly secured, at the distance of some miles above the cataracts, while his wife sat on the shore to watch his slumbers. After some time, a sailor, from one of the vessels on the lake, happened to arrive at the spot, and began to take some indecent liberties with the Indian female. The woman naturally attempted to rouse her husband, but before she could effect her design, the brutal mariner cut the cord of the canoe and set it adrift. The little vessel glided swiftly down the stream, and in the space of a few minutes it was seen to enter the Rapids. The Indian, awakened by the violent motion of the waves, started up, and on perceiving his perilous situation, he grasped his paddle with a look of inexpressible horror; but finding it absolutely impossible to stem the force of the current, he calmly wrapped himself up in his blanket, and resumed his former position at the bottom of the canoe. In the space of a few moments, he was hurried down the precipice, and was never discovered more."

CARNIOLA QUICKSILVER-MINES.

The mines of quicksilver, near Idra, in Carniola, are, perhaps, the richest of their kind in Europe: and were first discovered in the year 1497, in the following singular manner. A cooper having one evening placed a new tub under a dropping spring, in order to try if it would hold water, when he came in the morning found it so heavy, that he could hardly move it. At first the superstitious notions that are apt to possess the minds of the ignorant, made him suspect that his tub was bewitched; but at last, perceiving a shining fluid at the bottom, he went to Laubatch, and showed it to an apothecary, who immediately dismissed him with a small gratuity, and bid him bring some more of the same stuff, whenever he could meet with it. This the poor cooper frequently did, being highly pleased

with his good fortune, till, at length, the affair being made public, several persons formed themselves into a society, in order to search farther into the quicksilver-mine. In their possession it continued, till Charles, duke of Austria, perceiving the great importance of such a work, gave them a sum of money, as a compensation for the expences they had been at, and took it into his own hands.

The subterraneous passages of this mine are so extensive, that it would take up several hours to go through them. The greatest perpendicular height, computing from the entrance of the shaft, is eight hundred and forty feet; but as they advance horizontally under a high mountain, the depth would be much greater, if it were measured from the surface of the hill. One way of descending down the shafts is by a bucket; but as the entrance is narrow, the bucket is liable to strike against the sides, or to be stopped in the way, so that it may be easily overset. The other way of going down is that of descending by a great number of ladders, placed obliquely; but as the ladders are wet and narrow, a person must step very cautiously to prevent himself from falling. In some of the subterranean passages the heat is so intense, as to throw a man into a profuse perspiration; and formerly, in some of the shafts, the air was so extremely confined, that several miners were suffocated by a kind of igneous vapour; but by sinking the main shaft deeper, the progress of this mischief has been happily prevented. Near the main shaft is a large wheel, and an hydraulic machine to raise the water from the bottom of the mine.

Virgin Mercury is prepared by nature, and is found in some of the ores of this mine, in a multitude of little drops of pure quicksilver: it is also to be met with in a kind of clay, and sometimes flows down the passages or fissures of the mine in a small continued stream, so that a man has frequently gathered in six hours thirty-six pounds of Virgin Mercury, which bears a higher price than common quicksilver. The rest is extracted

from cinnabar, or ore of quicksilver, which is pounded, washed, and distilled in large iron retorts, whence the mercury comes over pure into a receiver. Eight hundred retorts are employed at one time in the furnaces belonging to this mine; and we may judge of the vast quantities of quicksilver procured from them, by the remarks of an intelligent traveller, who tells us, that he saw in the castle above four hundred and seventy tons of it in barrels, and in another place, as much ore as would take up two years to distil.

Many of the miners are afflicted with a nervous disorder, accompanied with violent tremblings, convulsive motions of the hands and legs, and frightful distortions of the face. These disorders may be chiefly attributed to the Virgin Mercury, which in a surprising manner insinuates itself into the bodies of the miners, so that when they go into a warm bath, or are put into a profuse sweat by steam, drops of pure mercury have been actually known to issue through their pores. These mines are sometimes infested with rats and mice, which feed on the crumbs of bread, &c. dropped by the miners at their meals; but these animals soon fall victims to the same convulsive disorders which attack the workmen.

FINIS.

Plummer and Brewis, Printers, Love Lane, Eastcheap.

INDEX.

A. Page.

Air Pump 201
Andes, the 139
Antiquities near Naples..... 270
Alps, the 97
Art of Making Pins.. 13

B.

Banian Tree 24
Bavarian Salt-Works..298
Beaver, the..... 242

C.

Casting Metals..... 209
Cascade near Terni.. 282
Catacombs or Mummy Pits 65
Cathedral of St. Peter's at Rome..... 42
Colossus of Rhodes.. 77
Chinese Wall 78
Cochineal Insects.... 91
Chimpanzee or Pigmy 168
Curious Account of a Wild Man 265

D.

Dreadful Devastations of the Locusts..... 3
Dexterity of a Goat.. 228

E.

Economy of the Bee . 32
Elephant, the 286
Everlasting Fire..... 90

Page.

F.

Fall of the Niagara.. 302
Fecundity of Plants.. 242
Funerals of the Hindoos 176
Fountain Trees..... 160
Fresh and Salt Lake of Mexico 263

G.

Grotto of Antiparos.. 83
Grand Road from Petersburgh to Moscow..... 183

H.

Humming Bird..... 269

I.

Instances of Bodily Strength..... 259
Instinct of Animals .. 294
Invention of Paper and its Manufacture ... 151
Inundation of the Nile 45
Inns in Eastern Countries 254

J.

Jerusalem and Neighbourhood 119

L.

Land Crab..... 70
Land Ship..... 149

Page.

M.

Mines of Carniola.... 304
Mines of Peru..... 147
Mines of Dalmora ... 179
Mole and Worm..... 260
Mount Vesuvius and Etna..... 104
Musical Pigeon 262

N.

Natural Bridge of Virginia..... 94
Nutmeg, Cinnamon, & Clove Trees..... 248

O.

Orang Outang 166
Ostrich, the..... 134
Origin and Invention of Clocks..... 18
Origin of Important Discoveries 246

P.

Parrot, the..... 157
Phenomena of Burning Springs 11
Poison Tree of North America..... 240
Pyramids of Egypt .. 54

R.

Rattle-Snake..... 67
Remarkable Quarry. 150
Remarkable instances of Abstinence..... 163
Ruins of Herculaneum and Pompeii.. ... 299

Page.

S.

Salt-Mines of Weilitska 15
Sagacity and Economy of the Ants..... 26
Sea Cow 79
Sea Cat 81
Sea Snake..... 239
Secretary Falcon 96
Silk Worm..... 229
Spider, the 208
St. Paul's 185
Stadhouse of Amsterdam 155
Stonehenge 235
Surprising Cupressus Distichia 268

T.

Tarantula, the..... 266
Turtle or Tortoise ... 74
Tar Lake..... 171
Tower, the 192
Torpedo, the..... 255
Terrible Sea-Monster. 264

U.

Upas, or Poison Tree 1

W.

Westminster Abbey.. 186
Whirlpools 266
Wonders in the Heavens 217
Wonders at the Fireside 223
Wonderful Things produced by Art..... 276
White Bear 181